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GOVERNMENT REPORTS

Announcements & Index

12 June 5, 1981

U.S. Department of Commerce
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GOVERNMENT REPORTS

Announcements & Index

Volume 81, Number 12 June 5, 1981

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SAMPLE ENTRY

Field 12—MATHEMATICAL SCIENCES
Group 12A—Mathematics and Statistics
PB80-104045 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Constructed Facilities Div.
Computation of Hankel Transforms Using the Fast-Fourier Transform Algorithm,
E. Kausel, and G. Bouckovalas. Aug 79, 49p
R79-12, NSF/RA-79-12, NSF/RA-790206
Grant NSF-ENV77-18339

An efficient numerical procedure is presented for the computation of Hankel Transforms. The algorithm is based on the expression of the Hankel Transform in terms of a two-dimensional Fourier Transform, which is then reduced to only one dimension. The latter is then evaluated with the Fast Fourier Transform algorithm. Examples are presented, and a listing of the computer program included.

NTIS Subject Category
NTIS Subcateogry
NTIS order number Availability/Price codes
Corporate or Performing Organization

Report title

Personal authors Report date Page count
Report number(s)
Contract or grant number(s)

Abstract

1. AERONAUTICS

1A. Aerodynamics

AD-A094 751/5 PC **A11**/MF **A01**
Nielsen Engineering and Research, Inc., Mountain View, CA.

Experimental and Theoretical Study of Flow Fields and Store Forces in Close Proximity to a Triple Ejection Rack at Transonic Speeds.
Final rept. Jun 79-Jun 80,
Frederick K. Goodwin, and Jack N. Nielsen. Sep 80, 247p NEAR-TR-222, NWC-TP-6210, AD-E900 055
Contract N60530-79-C-0169

A combined experimental-theoretical investigation has been made to study the flow fields and store loads in the proximity of a triple ejection rack mounted on an inboard wing pylon of an F-4C airplane. The experimental investigation, made in the 4-Foot Transonic Wind Tunnel at AEDC, included attached load measurements on models of a Mark-83 bomb with and without fins, as well as load measurements on a sting-mounted (CTS) model of the bottom store in the proximity of the rack. In addition, flow-field measurements were made in the proximity of the TER. Systematic data were taken in an airplane build-up sequence including additions of the wing pylon, rack, one shoulder store and two shoulder stores from M infinity equals 0.6 to 0.95. Strong interference effects were found within less than one store diameter of the rack which greatly affected the values of the attached loads. Systematic comparisons were made between experimental and the predictions of a store separation computer program for induced flow fields and store loads due to addition of the pylon, rack, and shoulder stores. For the effects of the rack and shoulder stores improvements are required in the computer program to obtain better load predictions for the store near the attached position. Specific suggestions on how to effect these improvements are made.

AD-A094 765/5 PC **A11**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.

Field 1—AERONAUTICS

Group 1A—Aerodynamics

An Interactive Computational Aerodynamics Analysis Program.
Master's thesis,
Enrique G. Hernandez. Dec 80, 248p Rept no. AFIT/GAE/AA/80D-9

This report details how existing aerodynamic analysis programs were combined and integrated into a fully interactive analysis program. The resulting program has several levels of user assistance, complete error protection, and protection against fatal terminations. The program was built around an aerodynamics analysis code which is capable of predicting the real fluid sectional characteristics of airfoils in flows with subcritical Mach numbers. In addition to the viscous flow solution, the program is also capable of several airfoil modification functions. The program was developed as the basic building block upon which several other aerodynamics analysis codes will be added in the future. (Author)

AD-A094 775/4 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Higher-Order Trapezoidal Vector Vortex Panel for Subsonic Flow.
Master's thesis,
Ronald E. Luther. Dec 80, 95p Rept no. AFIT/GAE/AA/80D-14

A higher-order trapezoidal vector vortex panel method is developed for application to linearized subsonic potential flow. Each panel is subdivided into two triangular subregions on which a quadratic vorticity strength distribution is prescribed for both the spanwise and chordwise components of the vorticity vector. The vorticity strength distribution is expressed as a function of the components of the vorticity vector at selected nodes of the boundary of each triangular subregion. Nodal values on the shared boundary of the subregions are made equal, assuring continuity of the vorticity distribution function throughout the trapezoidal panel. A lifting surface of no thickness is modeled with a network of the trapezoidal panels. Again, nodal values on the common panel boundaries are matched to achieve complete continuity of the vorticity distribution throughout the lifting surface. Aerodynamic data for several wing planforms is obtained with the flow model. Results from this method are compared to those from other computational and theoretical methods. (Author)

N81-15979/0 PC **A02**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
A Reverse Pseudo-Unsteady Aerodynamic Calculation Method.
G. Meauze. Jul 80, 22p RAE-LIB-TRANS-2048
Transl. into English from Rech. Aerosp. (France), No. 1, 1980 p 23-30.

A method is described that provided the geometry of a wall corresponding to a given velocity distribution. The velocity distribution can be assigned to the whole duct wall whose geometry is looked for, or only to an element of it, where the remaining geometry is assumed known. This flexibility of use confers on the method a wide field of application. The method makes it possible to treat the case of flow with shock waves for a two dimensional flow with possible variation of cross section. This type of calculation finds an immediate application for defining the walls of a duct, such as an air intake or a nozzle, as well as the profiles of turbomachine blades. This method can also contribute to the understanding and exploitation of experimental results, making it possible to determine the flow field corresponding to the measured wall pressure distributions.

N81-15980/8 PC **A08**/MF **A01**
Iowa State Univ., Ames. Dept. of Aerospace Engineering.
Experimental Investigation of Vortices Shed by Various Wing Fin Configurations.
Final Rept.,
J. Iversen, and M. Moghadam. Jan 81, 157p NASA-CR-163874, ISU-ERI-AMES-81112
Grant NSG-1582
Master's thesis.

Forty-six different fins, which were members of twelve plan-form families, were tested. A two dimensional Boeing single element airfoil at an angle of attack of eight degrees and a sweepback angle of thirty-two was used to simulate a portion of the wing of a generator aircraft. Various free stream velocities were used to test any individual fin at its particular angle of attack. While the fin itself was mounted on the upper surface of the generator model, the angle of attack of each fin was varied until stall was reached and/or passed. The relative fin vortex strengths were measured in two ways. First, the maximum angular velocity of a four blade rotor placed in the fin vortex center was measured with the use of a stroboscope. Second, the maximum rolling moment on a following wing model placed in the fin vortex center was measured by a force balance.

N81-16413/9 PC **A14**/MF **A01**
Stanford Univ., CA. Thermosciences Div.
Turbulent Boundary Layer on a Convex, Curved Surface.
J. C. Gillis, J. P. Johnston, W. M. Kays, and R. J. Moffat. Sep 80, 311p HMT-31, NASA-CR-163868
Grant NSG-3124, Contract NAG3-3

The effects of strong convex curvature on boundary layer turbulence were investigated. The data gathered on the behavior of Reynolds stress suggested the formulation of a simple turbulence model. Three sets of data were taken on two separate facilities. Both rigs had flow from a flat surface, over a convex surface with 90 deg of turning, and then onto a flat recovery surface. The geometry was adjusted so that, for both rigs, the pressure gradient along the test surface was zero - thus avoiding any effects of streamwise acceleration on the wall layers. Results show that after a sudden introduction of curvature, the shear stress in the outer part of the boundary layer is sharply diminished and is even slightly negative near the edge. The wall shear also drops off quickly downstream. In contrast, when the surface suddenly becomes flat again, the wall shear and shear stress profiles recover very slowly towards flat wall conditions.

N81-16418/8 PC **A04**/MF **A01**
Florida Univ., Gainesville. Dept. of Engineering Sciences.
Velocity Field Near the Jet Orifice of a Round Jet in a Crossflow.
Interim Rept.,
R. L. Fearn, and J. P. Benson. Dec 79, 72p NASA-CR-152353
Grant NSG-2288, Contract NGL-10-005-127

Experimentally determined velocities at selected locations near the jet orifice are presented and analyzed for a round jet in crossflow. Jet to cross flow velocity ratios of four and eight were studied experimentally for a round subsonic jet of air exhausting perpendicularly through a flat plate into a subsonic crosswind of the same temperature. Velocity measurements were made in cross sections to the jet plume located from one to four jet diameters from the orifice. Jet centerline and vortex properties are presented and utilized to extend the results of a previous study into the region close to the jet orifice.

N81-16422/0 PC **A04**/MF **A01**
European Space Agency, Paris (France).
A Theoretical Investigation on the Effect of the Pressure Strain Correlations on the Development of Three Dimensional Turbulent Boundary Layers.
J. C. Rotta. Jun 80, 74p ESA-TT-618, DFVLR-FB-79-05
Transl. into English of "Eine Theoret. Untersuchung ueber den Einfluss der Druckscherkorrelationen Aug die Entwicklungdreidimensionaler Turbulenter Grenzschichten" Dfvlr, Goettingen, (Germany, F.R.). Report Dfvlr-FB-79-05, Feb. 1979. Original Report in German Previously Announced as N80-22654.

A theoretical investigation of the process of shear stress generation in three dimensional turbulent boundary layers suggests that the mean products of pressure and rate of strain fluctuations contribute substantially to the directional differences of the resultant shear stress and the resultant mean rate of strain. Two approximate relationships are developed and comparative calculations of the turbulent boundary layers on infinite swept wings are carried out, integrating the partial differential equations for the mean velocities and the transport equations for the shear stresses and kinetic energy. The results of two flow cases are compared with available experimental results.

1B. Aeronautics

AD-A094 674/9 PC **A09**/MF **A01**
Bell Helicopter Textron, Fort Worth, TX.
The Data from Aeromechanics Test and Analytics - Management and Analysis Package (DATAMAP). Volume II. Systems Manual.
Final technical rept.,
Richard B. Philbrick. Dec 80, 189p BHT-699-099-025-VOL-2, USAAVRADCOM-TR-80-D-30B
Contract DAAK51-79-C-0015

The Data from Aeromechanics Test and Analytics - Management and Analysis Package (DATAMAP) was designed and programmed as a computer software tool for data management and processing of large, time-based data bases. Particular attention is given to rotorcraft-related analyses. The package will process data stored in two basic formats. The first format is that used for the Operational Loads Survey (OLS) test data base and anticipated for use in planned flight test programs. The second format is more general; it accommodates various data structures common to analytical data bases. This particular input capability is demonstrated by an interface between the Rotorcraft Flight Simulation Program (C81) and DATAMAP. The package transfers selected data to a large, direct access disc file and maintains the data on a semi-permanent basis. Data are retrieved from this file, processed, and displayed interactively or in batch. Plot output is generated on a Tektronix 4014 or an incremental plotter (e.g., Calcomp). A small sample of available processing options includes amplitude spectrum, harmonic analysis, digital filtering, auto-spectral density, frequency response function, acoustic analyses, and blade static pressure and normal force coefficient derivations.

AD-A094 733/3 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Time-Constrained Maximum-Energy Turns.
Master's thesis,
Steven Petersen. Dec 80, 73p Rept no. AFIT/GAE/AA/80D-17

The object of this study is to find the trajectories which a high performance aircraft would employ to maximize the change in specific energy during a prescribed turn. These values of the change in specific energy are compared to the changes in specific energy which result from a minimum time turn. A suboptimal control approach, which uses both gradient and second-order techniques, is employed to find the maximum specific energy trajectories. The results of the study show that turning times slightly greater than the minimum turning time allow large increases in aircraft specific energy, and that the trajectories can be flown with simple control inputs. (Author)

AD-A094 965/1 PC **A08**/MF **A01**
Advisory Group for Aerospace Research and Development, Neuilly-sur-Seine (France).
Aircrew Safety and Survivability (Limited to Combat Aircraft).
Conference proceedings,
R. Auffret. Oct 80, 162p Rept no. AGARD-CP-286
Presented at the Aerospace Medical Panel Specialists' Meeting held in Bode, Norway, 20-23 May 1980. Text in French and English.

Contents: Part I Cold Protection; Prediction of Immersion Hypothermia in Men Wearing Anti-Exposure Suits and/or using Life Rafts, Radio-Temperature Transducers for Measurement of Thermal Stress in Cold Water Immersion Suit Research and Development, Laboratory Studies on Cooling in Single Seat Dinghies, Central Rewarming Technique in the Treatment of Profound Accidental Hypothermia, Principles of Teaching Winter Survival to Aircrew, Immersion Survival - the Key Factors.

Part II - Accident Analysis. Ejection Emergency; Survival after Ejection 1968-1979, Selected Aeromedical Factors in U.S. Navy Combat-Type Aircraft Mishaps, Seat Pack for Fighter Aircraft Operating on the NATO Northern Flank, Neurotraumatological Aspects in Ejected Pilots, Traumatic Lesions of the Cervical Spine 1971-1979 - Incidence-Severity and Classification. Part III Survivability Equipment. Human Performance During Difficult Missions; An Option for Enhanced Aircrew Survivability, A Survival Avionics System for the 1980's.

AD-A095 009/7 PC **A02**/MF **A01**
Naval Air Engineering Center, Lakehurst, NJ. Engineering Dept. (SI).
System Safety Program Report Mk 1 Mod 0 LSO HUD Console System.
Final rept.,
John Glenn. 30 Jan 81, 23p Rept no. NAEC-91-7983

The MK 1 MOD 0 LSO HUD Console System provides aircraft recovery information to the Landing Signal Officer aboard aircraft carriers. This report documents the System Safety Program accomplishments (safety analysis, verification, and test) and assesses system safety. (Author)

PB80-910414 PC**$5.00**/MF**$5.00**
National Transportation Safety Board, Washington, DC. Bureau of Accident Investigation.
Aircraft Accident Report - Air Traders International, Lockheed 1049H, N74CA, Columbus, Indiana, June 22, 1980.
23 Dec 80, 30p NTSB-AAR-80-14
Paper copy also available on subscription, North American Continent price $50.00/year; all others write for quote.

About 1359 e.s.t., on June 22, 1980, Air Traders International, Lockheed 1049H, N74CA, crashed in a soybean field shortly after takeoff from runway 22 at Columbus Bakalar Airport, Columbus, Indiana. The intended destination of the flight was Seattle, Washington. A flightcrew of three and five passengers were onboard the aircraft which was carrying a cargo of aircraft spare parts. Two flight crewmembers and one passenger were killed. The aircraft was substantially damaged during the accident sequence and was destroyed by postaccident ground fire. The National Transportation Safety Board determines that the probable cause of the accident was the flightcrew's inadequate and uncoordinated response to the No. 2 engine fire warning. The flight engineer failed to correct a gradual power decay on the other engines which occurred while he was retarding the No. 2 engine throttle, and the power decay went uncorrected by the pilot and copilot. The lack of coordination and the lack of corrective action may have been caused by the lack of recent flightcrew experience in the L-1049 aircraft.

1C. Aircraft

AD-A094 634/3 PC **A03**/MF **A01**
Lockheed-Georgia Co., Marietta.
Feasibility Study for C-141B Reduction of Wing Loads by Uprigging the Ailerons,
Gene S. Jamison. 10 Sep 80, 35p Rept no. LG80ER0144
Grant F09603-80-G-0417

This report summarizes an investigation into the feasibility of uprigging the ailerons on the C-141B to reduce wing loads. The potential wing loads reductions were based on early wind tunnel data and were corroborated by recent flight test data at a mid-span location. Crack growth computations were made for four wing locations. Significant increases in structural safety limits for the two lower surface locations ranged from an improvement factor of 1.18 (3 deg uprig) to 2.731 (6 deg uprig) depending on location. Similar percentage increases could be expected in inspection intervals and structural durability. Two wing upper surface locations showed no significant change from aileron uprigging. An examination of the potential impact on pitch trim requirements, roll response and dutch roll characteristics indicated only negligible effects from moderate aileron uprigging. A negligible degradation in the maximum lift at buffet onset was predicted. Drag increases for a range of uprig positions and lift coefficients were established from coordinated C-141/C-5A data. Two methods of uprigging were described which permit changing the uprig inflight if required. Flight tests to confirm predictions are recommended. (Author)

AD-A094 672/3 PC **A05**/MF **A01**
Bell Helicopter Textron, Fort Worth, TX.
Helicopter External Load Acquisition Technology Investigation.
Final rept.,
Herman Franks, and B. C. Bowen. Dec 80, 94p
USAAVRADCOM-TR-80-D-28
Contract DAAK51-79-C-0058

The purpose of this study was to identify, analyze, and evaluate methods of improving the acquisition of sling and/or netted loads by a hovering helicopter under poor visibility and other hazardous conditions. Flight and ground crew tasks required to support the external cargo operations were analyzed and resulting baseline crew workloads defined. Hazard analyses of the mission phases were accomplished and hazard categories identified. The results of these analyses were then used as criteria for selecting potential concept candidates for improvement in external load acquisition. Ten candidate concepts were identified. Each was evaluated against established baselines and then ranked in order of improvement over the baseline concept. (Author)

AD-A094 688/9 PC **A06**/MF **A01**
Rockwell International, Columbus, OH. Columbus Aircraft Div.
Design and Test of a Hydra-Optic Flight Control Actuation System (HOFCAS) Concept.
Final rept. 18 Sep 79-17 Dec 80,
Lloyd L. Kohnhorst, and Domenic A. Magnacca. Dec 80, 112p NR80H-87, NADC-79156-60
Contract N62269-79-C-0709

This report describes the development, testing and demonstration of a Hydra-Optic Flight Control Actuation System (HOFCAS) suitable for the actuation tasks of a Digital Fly-By-Wire flight control system. HOFCAS offers a realistic, cost effective approach to reducing the susceptibility of aircraft fly-by-wire systems to EMP, EMI, RFI, lightning, etc. By removing the conventional wiring to the actuation areas of an aircraft, the concept eliminates the opportunity for electromagnetic hazards to enter the system. The HOFCAS concept provides a direct drive, hydraulically powered surface actuation system that provides immunity to electromagnetic radiation. The direct drive actuator, developed in a previous multiphase Navy Advanced Flight Control Actuation System (AFCAS) program, uses an electrical torque motor to power a single stage hydraulic valve for control of the actuator. A hydraulically powered alternator supplies the electrical power needed to operate the torque motor. The actuator command signal is supplied by a fiber optic link. The HOFCAS was configured to operate the directional control system in a T-2C aircraft. The AFCAS program demonstrated direct digital control of a surface actuator, and the HOFCAS extends this technology to demonstrate that conventional interconnecting electrical wiring to the surface actuators can be eliminated.

AD-A094 696/2 PC **A09**/MF **A01**
Naval Academy, Annapolis, MD. Div. of Engineering and Weapons.
Microprocessor Control of Low Speed VSTOL Flight.
Final technical rept. 1978-1979,
Robert Victor Walters. 8 Jun 79, 199p

The objective of this project has been to design an improved three-axis stability augmentation system (SAS) for the AV-8B Advanced Harrier VSTOL aircraft using microprocessor-based digital control. The research focuses on improving the handling qualities of the airplane through SAS redesign in the low speed flight regime. Particular attention is paid to the so-called weather-cocking instability encountered in transition (hover to conventional and vice versa) flight. Until quite recently, there has been a dearth of information about the flight characteristics of the Harrier. A major breakthrough in this field was achieved by the development of MCAIR's X22A AV-8B mathematical model, which yielded a set of linearized stability derivatives for the aircraft. The first step toward the improvement of the AV-8B SAS requires the utilization of these coefficients in the development of an analog/hybrid model of both the aircraft itself and of the unmodified SAS. The controller design employs digital state feedback control to relocate the system closed loop poles. The conclusion reached is that this method of control represents a valid approach to the final solution of the Harrier's stability and control problems. A long range goal of this research is that this controller design concept be applied to future aerospace vehicles.

AD-A094 717/6 PC **A05**/MF **A01**
Northrop Corp., Hawthorne, CA. Aircraft Group.
Background Information and User Guide for MIL-F-9490D. Appendix.
Final rept. Jul 79-Jan 80,
John F. Moynes. Jan 80, 90p NOR-80-35, AFFDL-TR-74-116-SUPPL-1
Contract F33615-79-C-3617
Appendix to report dated Jan 75, AD-A029 074.

This document is in support of Amendment 1 of Military Specification MIL-F-9490D, 'Flight Control Systems-Design, Installation and Test of, Piloted Aircraft, General Specification For' and AFFDL-TR-74-116, 'Background Information and User Guide for MIL-F-9490D.' In addition to substantiating background for the amended requirements, the document provides additional user guide information for interpretation and use of the specification. The bulk of this report addresses the interrelated topics of digital flight controls, fly-by-wire controls, and self-test and monitoring. These topics are addressed in many requirement areas. Of particular note are the additions of a redundancy management requirement and discussion, which were absent in the D revision, and the integration of software requirements for FCS design and documentation into the specification. (Author)

AD-A094 769/7 PC **A08**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Investigation of an Improved Flutter Speed Prediction Technique for Damaged T-38 Horizontal Stabilators Using NASTRAN.
Master's thesis,
Roger Kent Thomson. Dec 80, 154p Rept no. AFIT/GAE/AA/80D-21

This thesis concerns the development of a finite element model of the T-38 horizontal stabilator for use on NASTRAN. The model is to be used to analyse degradations in flutter speed due to repair. Static analysis has shown the model to be lacking in torsional stiffness. The probable cause being the inability of NASTRAN plate bending elements to model torsion cells. An increase of elastic and shear moduli of plate bending elements in the model by 30 percent produced more accurate results but additional investigation is necessary. Modal analysis has pointed to a modeling error in the root, trailing edge area. The affect has caused an additional node to appear on the trailing edge for modes above 100 cps in a free-free condition. Investigation of the steady aerodynamic pressure distribution over the stabilator shows good correlation with experimental results. A flutter analysis procedure was established and the affects of the errors found in the structural model were investigated. With no corrections made to the model, a flutter speed equivalent to that predicted using strip theory was achieved for the sea level condition. (Author)

AD-A094 770/5 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Calculation of Airloads for a Flexible Wing via NASTRAN.
Master's thesis,
Lance Eliot Chrisinger. Dec 80, 78p Rept no. AFIT/GAE/AA/80D-2

This thesis describes the use of the NASTRAN program (Level 17.0) in the calculation of flexible wing airloads and stresses. The problems of interfacing aerodynamic and structural models are discussed with assumptions needed to solve them. Two different methods of transferring the aerodynamic forces into a structural load vector are pre-

sented. A Direct Matrix Abstraction Program was developed for use in these calculations. This sequence is limited to the use of one doublet-lattice panel for the aerodynamic model and requires several new data blocks for execution. Although these data blocks were input with the bulk data deck to test the sequence, a new preliminary module has been constructed to build them internally. The results of this investigation show that NASTRAN can be used in calculating the airloads and stresses for a flexible wing. This new sequence has extended the capability of NASTRAN to allow for the application of internally generated steady airloads to the structural model. (Author)

AD-A094 880/2 PC **A02**/MF **A01**
Sibley School of Mechanical and Aerospace Engineering, Ithaca NY.
Progress in Finite-Volume Calculations for Wing-Fuselage Combinations,
D. A. Caughey, and Antony Jameson. 23 Aug 79, 11p
Contract N00014-77-C-0033
Pub. in AIAA Jnl., v18 n11 p1281-1288 Nov 80. Prepared in cooperation with New York Univ., NY. Courant Inst. of Mathematical Sciences.

No abstract available.

AD-A094 886/9 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
The Formulation and Analysis of an Operating and Support Cost Model for the Advanced RPV Squadron.
Master's thesis,
Nazaire G. LeBlanc. Dec 80, 113p Rept no. AFIT/GSM/SM/75D-17

A study and analysis of the operating and support (O & S) costs of an Advanced RPV squadron was performed. This study concentrated on the determination of costs for operations and support while the weapon system was still in its conceptual phase of acquisition. It was assumed that early decisions made by the system program manager, with respect to design parameters for a weapon system, can have a major impact on the costs for operating and supporting that weapon system. A cost model was formulated, to be used by the ARPV program manager, that provided operating and support cost visibility. Its purpose was as a tool to provide insight into what cost elements were the high cost drivers. Also, it was intended to be useful in applying different operating and support concepts in order to arrive at the most cost effective squadron concept. For this purpose, a squadron operations and maintenance concept was developed to demonstrate the utility of the model. Finally, several cost variables were examined to show their impact on total O & S costs as they were varied over a range of values. (Author)

AD-A094 986/7 PC **A04**/MF **A01**
Aeronautical Research Labs., Melbourne (Australia).
The Stability of Portable Bridges Carried on Slings Beneath Helicopters,
N. Matheson. Jan 80, 60p Rept no. ARL/AERO-154

The Australian Armed Forces have class 16 airportable bridges in service, and there is a requirement to transport them beneath Chinook helicopters. Before the bridges can be carried as routine, it is necessary to determine the effects they have on the stability and flying qualities of the helicopter. In this report, information available concerning the operation of helicopters carrying airportable bridges is reviewed. In addition, a series of wind tunnel tests have been made with 1/15 scale models to determine the maximum safe speed for a helicopter carrying two different class 16 bridges, a 16 m (52 ft) clear span, and a 22 m (72 ft) raft, separately on a single hook. The tests indicated that the 16 m (52 ft) bridge could be carried safely at speeds up to 65 knot on a 16 m (53 ft) cable, provided it was slung 5 deg nose up in the static condition, and two small flat fins were attached to the aft end. The raft had to be carried in two loads, A and B, because of weight limitations. Load A, which consisted mainly of deck boxes and accessories, could be safely carried without fins at speeds up to 60 knot on a 16 m (53 ft) cable provided it was rigged 1 deg to 2 deg nose up. Load B, which consisted of four ramps and four articulators, could also be carried at 60 knot, but small flat fins were required and it had to be slung 5 deg nose up and carried on a 10 m (33 ft) cable.

AD-A094 989/1 PC **A03**/MF **A01**
Aeronautical Research Labs., Melbourne (Australia).
An Experimental Investigation of the Effects of Trailing-Edge Strips on the Unsteady Aerodynamic Forces on Tabs,
G. Long, and P. A. Farrell. Mar 80, 37p Rept no. ARL/STRUC/NOTE-459

A fairly common problem on new aircraft is that of achieving good control surface effectiveness. Often boundary layer thickness and interference from other surfaces may cause flow separation on all or part of the control. This reduces control efficiency and can cause serious problems in achieving good control of aircraft response. These types of problems are difficult to predict analytically or from wind-tunnel tests. Usually the first evidence of such difficulties occurs during prototype flying and consequently serious efforts must be made to find a 'fix' which can be introduced fairly simply and cheaply at a late stage in the design. These 'fixes' often involve vortex generators, placed on or ahead of the control, or thickening of the trailing edge of the control. The latter may be simply achieved by attaching a small angle to one or both sides to the control along the trailing edge. The aim of these and other methods is to improve the effectiveness of the control and hopefully to increase this to its theoretical or design value. While the effect of such modifications is fairly well known for steady flow, little evidence is available of the effect in unsteady flow. There are no theoretical methods of predicting unsteady aerodynamic forces on oscillating control surfaces which have vortex generators or trailing-edge angles. Usually complete reliance is based on classical thin lifting surface theories for predicting flutter speeds and frequencies. The work described was undertaken as a result of an accident to the Nomad aircraft in which flutter occurred as a result of fitting trailing-edge strips to the tailplane tabs.

AD-A095 017/0 PC **A02**/MF **A01**
Aeronautical Research Labs., Melbourne (Australia).
The Shape of a Cable Used for Towing a Pitot-Static Probe from a Helicopter,
N. E. Gilbert. Jun 80, 23p Rept no. ARL/AERO NOTE-397

The shape of a cable used to tow a pitot-static probe from a helicopter is estimated for airspeeds up to 120 kn. These estimates show the probe to be well outside the influence of the rotor wake. Experimental results obtained from photographs taken from a chase helicopter are used to resolve an uncertainty in cable drag coefficient and comparisons are made with the theoretical predictions of overall shape. The effect of the assumption of a weightless cable and of reduced probe drag are also shown. (Author)

AD-A095 142/6 PC **A02**/MF **A01**
Army Research and Technology Labs., Fort Eustis, VA.
Remotely Piloted Vehicle (RPV) Test Facility.
Technical note,
John A. Chappell. Jul 79, 17p Rept no. USARTL-TN-36

This report describes the Remotely Piloted Vehicle (RPV) Test Facility located at the Applied Technology Laboratory, Fort Eustis, Virginia. Included is a description of the current physical plant, instrumentation, and test capabilities. (Author)

AD-A095 143/4 PC **A04**/MF **A01**
Hughes Helicopters, Culver City, CA.
A Computerized Balancing Technique for Supercritical Helicopter Shafting.
Final rept. Sep 78-Feb 80,
G. J. Korkosz. Dec 80, 55p HH-80-223, USAAVRADCOM-TR-80-F-15
Contract DAAK51-78-C-0021

A full-size supercritical helicopter tail rotor drive shaft has been balanced using a quasi-static data acquisition technique. The method employs ultrasonic gaging equipment and a digital computer to determine the amount and location of the balance correction. In one 15-minute pass, the system has demonstrated the ability to locate the center of gravity (CG) of the shaft within 0.001 inch. The balanced shaft has run at speeds up to 10,500 rpm, including sustained operation at four critical speeds, with acceptable vibration at critical speeds. Operation at the design speed (between 2nd and 3rd critical speed) was well within standard high quality balance values.

AD-A095 148/3 PC **A07**/MF **A01**
Wilson-Hill Associates, Inc., Washington, DC.
General Aviation Avionics Statistics.
Annual rept. for Cy1978,
Judith C. Schwenk, Paula Shafer, Preeti Pandit, and Wilson Hill. Dec 80, 127p FAA-MS-80-7, TSC-FAA-80-25
Contract DOT-TSC-1750

This report presents avionics statistics for the 1978 general aviation (GA) aircraft fleet and is the fifth in a series titled General Aviation Avionics Statistics. The statistics are presented in a capability group framework which enables one to relate airborne avionics equipment to the capability for a GA aircraft to function in the National Airspace System. The word 'capability' is used in this report to mean in what segments of the airspace an aircraft can fly, under what flight rules it can fly, and at what airports it can land. The framework permits the GA fleet to be divided into groups according to their capabilities as dictated by the avionics configurations of the aircraft. Differences in various characteristics of the aircraft are examined among the capability groups. The FAA's Sample File of results from the 1978 GA Activity and Avionics Survey is the source of all the statistical data used in this report. (Author)

N81-15974/1 PC **A24**/MF **A01**
Kansas Univ., Lawrence.
A Feasibility Study for Advanced Technology Integration for General Aviation.
Final rept. 10 Apr. 1979 - 9 Apr. 1980.
D. L. Kohlman, G. T. Matsuyama, K. E. Hawley, and P. T. Meredith. Nov 80, 533p NASA-CR-159381, KU-FRL-414-1
Contract NAS1-15770

An investigation was conducted to identify candidate technologies and specific developments which offer greatest promise for improving safety, fuel efficiency, performance, and utility of general aviation airplanes. Interviews were conducted with general aviation airframe and systems manufacturers and NASA research centers. The following technologies were evaluated for use in airplane design tradeoff studies conducted during the study: avionics, aerodynamics, configurations, structures, flight controls, and propulsion. Based on industry interviews and design tradeoff studies, several recommendations were made for further high payoff research. The most attractive technologies for use by the general aviation industry appear to be advanced engines, composite materials, natural laminar flow airfoils, and advanced integrated avionics systems. The integration of these technologies in airplane design can yield significant increases in speeds, ranges, and payloads over present aircraft with 40 percent to 50 percent reductions in fuel used.

N81-15977/4 PC **A10**/MF **A01**
Boeing Co., Seattle, WA.
A System for Aerodynamic Design and Analysis of Supersonic Aircraft. Part 4: Test Cases.
Final Report, Sep. 1978 - Aug. 1980.
W. D. Middleton, and J. L. Lundry. Dec 80, 225p NASA-CR-3354, D6-41840-4
Contract NAS1-15534
4.

An integrated system of computer programs was developed for the design and analysis of supersonic configurations. The system uses linearized theory methods for the calculation of surface pressures and supersonic area rule concepts in combination with linearized theory for calculation of aerodynamic force coefficients. Interactive graphics are optional at the user's request. Representative test cases and associated program output are presented.

N81-15981/6 PC **A05**/MF **A01**
Neilsen Engineering and Research, Inc., Mountain View, CA.
Theoretical Study of Hull-Rotor Aerodynamic Interference on Semibuoyant Vehicles.
Technical rept., 14 Feb. - 7 Dec. 1977.
S. B. Spangler, and C. A. Smith. Apr 78, 97p
NASA-CR-152127, NEAR-TR-159
Contract NAS2-9512

Analytical methods are developed to predict the pressure distribution and overall loads on the hulls of airships which have close coupled, relatively large and/or high disk loading propulsors for attitude control, station keeping, and partial support of total weight as well as provision of thrust in cruise. The methods comprise a surface-singularity, potential-flow model for the hull and lifting surfaces (such as tails) and a rotor model which calculates the velocity induced by the rotor and its wake at points adjacent to the wake. Use of these two models provides an inviscid pressure distribution on the hull with rotor interference. A boundary layer separation prediction method is used to locate separation on the hull, and a wake pressure is imposed on the separated region for purposes of calculating hull loads. Results of calculations are shown to illustrate various cases of rotor-hull interference and comparisons with small scale data are made to evaluate the method.

N81-15982/4 PC **A07**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
A Flight Investigation of Performance and Loads for a Helicopter with RC-SC2 Main-Rotor Blade Sections.
C. E. K. Morris, Jr., R. L. Tomaine, and D. D. Stevens. Dec 80, 140p NASA-TM-81898, AVRADCOM-TM-81-B-1
Prepared in Cooperation with Army Aviation Research and Development Command, Hampton, VA.

The test envelope included hover, forward-flight speed sweeps from 33 to 74 m/sec (65 to 144 knots), and collective-fixed maneuvers at about 0.25 tip-speed ratio. The data set for each test point describes vehicle flight states, control positions, rotor loads, power requirements and blade motions. Rotor loads were reviewed primarily in terms of peak-to-peak and harmonic content. Lower frequency components predominated for most loads and generally increased with increased airspeed, but not necessarily with increased maneuver load factor.

N81-15983/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Flow Phenomena Along Fuselages and Wing-Fuselage Systems of Gliders.
J. Ostrowski, M. Litwinczyk, and L. Turkowski. Dec 80, 16p NASA-TM-75401
Transl. Into English from Arch. Budowy Maszyn (Poland), V. 25, No. 1, 1978 p 91-104. Original Language Document Was Announced as A78-36203. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The results are presented for visualization tests and measurements of the velocity field in diffusion regions (with a positive pressure gradient) for fuselages and transition regions between the wing and the fuselage. Wind tunnel and flight tests were performed. Specific emphasis was placed on examining the secondary flow influencing separation acceleration and the influence of the geometrical form of the wing fuselage system manifested by the occurrence of secondary flows of various types.

N81-15984/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Discussion of Test Results in the Design of Laminar Airfoils for Competition Gliders.
J. Ostrowski, S. Skrzynski, and M. Litwinczyk. Dec 80, 21p NASA-TM-75402
Transl. Into English from Arch. Budowy Maszyn (Poland), V. 25, No. 1, 1978 p 105-120. Original Language Document Was Announced as A78-36204. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The deformation of flow in the boundary layer and the local separation of a laminar layer (laminar bubbles) from various airfoils were investigated. These phenomena were classified and their influence is discussed. Various aerodynamic characteristics are discussed and the principles for prescribing pressure distribution to attain a high value of c sub z max with a possibly low drag coefficient are described.

N81-15985/7 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Some Wake-Related Operational Limitations of Rotorcraft.
H. H. Heyson. Dec 80, 53p NASA-TM-81920
Presented at the Fourth Midwest Helicopter Safety Seminar, Joliet, Ill., 3-5 Feb. 1981; Sponsored by the Illinois Dept. Of Transportation and the FAA.

Wind tunnel measurements show that the wake of a rotor, except at near hovering speeds, is not like that of a propeller. The wake is more like that of a wing except that, because of the slow speeds, the wake velocities may be much greater. The helicopter can produce a wake hazard to following light aircraft that is disproportionately great compared to an equivalent fixed wing aircraft. This hazard should be recognized by both pilots and airport controllers when operating in congested areas. Ground effect is generally counted as a blessing since it allows overloaded takeoffs; however, it also introduces additional operation problems. These problems include premature blade stall in hover, settling in forward transition, shuddering in approach to touchdown and complicatons with yaw control. Some of these problems were treated analytically in an approximate manner and reasonable experiment agreement was obtained. An awareness of these effects can prepare the user for their appearance and their consequences.

N81-15986/5 PC **A05**/MF **A01**
Mississippi State Univ., Mississippi State. Engineering and Industrial Research Station.
An Application of Wake Survey Rakes to the Experimental Determination of Thrust for a Propeller Driven Aircraft.
Final Rept.,
K. R. Hall, S. J. Miley, and H. J. Tsai. Feb 81, 76p NASA-CR-163920, MSSU-EIRS-ASE-81-3
Grant NSG-1454

The lack of slipstream static pressure distribution seriously affected the results but recommendations for removing the deficiency are discussed. The wake survey rake is shown to be a valuable tool in aircraft flight testing. Flow characteristics in the wake of the propeller were examined.

N81-16020/2 PC **A15**/MF **A01**
Douglas Aircraft Co., Long Beach, CA.
Cabin Fire Simulator Lavatory Tests.
Final Rept. Jun. 1978 - Jun. 1980.
K. J. Schutter, and D. M. Klinck. May 80, 344p
NASA-CR-160909, MDC-J4649
Contract NAS9-15591

All tests were conducted in the Douglas Cabin Fire Simulator under in-flight ventilation conditions. All tests were allowed to continue for a period of one hour. Data obtained during these tests included: heat flux and temperatures of the lavatory; cabin temperature variations; gas analyses for O2, CO2, CO, HF, HC1, and HCN; respiration and electrocardiogram data on instrumented animal subjects (rats) exposed in the cabin; and color motion pictures. All tests resulted in a survivable cabin condition; however, occupants of the cabin would have been subjected to noxious fumes.

N81-16021/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Ozone Contamination in Aircraft Cabins: Results from GASP Data and Analyses.
J. D. Holdeman, and G. D. Nastrom. 1981, 15p NASA-TM-81671, E-693
Presented at the 19TH Aerospace Sci. Meeting, St. Louis, 12-15 Jan. 1981; Sponsored by the American Inst. Of Aeronautics and Astronautics.

The global atmospheric sampling program pertaining to the problem of ozone contamination in commercial airplane cabins is described. Specifically, analyses of GASP data have: confirmed the occurrence of high ozone levels in aircraft cabins and documented the ratio of ozone inside and outside the cabins of two B747 airliners, including the effects of air conditioning modifications on that ratio; defined ambient ozone climatology at commercial airplane cruise altitudes, including tabulation of encounter frequency data which were not available before GASP; and outlined procedures for estimating the frequency of flights encountering high cabin ozone levels using climatological ambient ozone data, and verified these procedures against cabin measurements.

N81-16039/2 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Use of Constrained Optimization in the Conceptual Design of a Medium-Range Subsonic Transport.
S. M. Sliwa. Dec 80, 38p NASA-TP-1762, L-13946

Constrained parameter optimization was used to perform the optimal conceptual design of a medium range transport configuration. The impact of choosing a given performance index was studied, and the required income for a 15 percent return on investment was proposed as a figure of merit. A number of design constants and constraint functions were systematically varied to document the sensitivities of the optimal design to a variety of economic and technological assumptions. A comparison was made for each of the parameter variations between the baseline configuration and the optimally redesigned configuration.

N81-16041/8 PC **A09**/MF **A01**
Lockheed-Georgia Co., Marietta.
Turboprop Cargo Aircraft Systems Study, Phase 1.
J. C. Muehlbauer, J. G. Hewell, Jr., S. P. Lindenbaum, C. C. Randall, and N. Searle. Nov 80, 192p NASA-CR-159355, LG80ER0112
Contract NAS1-15708

The effects of advanced propellers (propfan) on aircraft direct operating costs, fuel consumption, and noiseprints were determined. A comparison of three aircraft selected from the results with competitive turbofan aircraft shows that advanced turboprop aircraft offer these potential benefits, relative to advanced turbofan aircraft: 21 percent fuel saving, 26 percent higher fuel efficiency, 15 percent lower DOCs, and 25 percent shorter field lengths. Fuel consumption for the turboprop is nearly 40 percent less than for current commercial turbofan aircraft. Aircraft with both types of propulsion satisfy current federal noise regulations. Advanced turboprop aircraft have smaller noiseprints at 90 EPNdB than advanced turbofan aircraft, but large noiseprints at 70 and 80 EPNdB levels, which are usually suggested as quietness goals. Accelerated development of advanced turboprops is strongly recommended to permit early attainment of the potential fuel saving. Several areas of work are identified which may produce quieter turboprop aircraft.

N81-16042/6 PC **A03**/MF **A01**
Boeing Aerospace Co., Seattle, WA. Engineering Technology Div.
Design, Fabrication and Test of Graphite/Polyimide Composite Joints and Attachments for Advanced Aerospace Vehicles.
Quarterly Technical Progress Rept., 1 Feb. - 30 Apr. 1980.
19 May 80, 31p NASA-CR-159112, QTPR-5
Contract NAS1-15644

Principal program activities dealt with the literature survey, design of joint concepts, assessment of GR/PI material quality, fabrication of test panels and specimens, and small specimen testing. Bonded and bolted designs are presented for each of the four major attachment types. Quality control data are presented for prepreg Lots 2W4651 and 3W2020. Preliminary design allowables test results for tension tests and compression tests of laminates are also presented.

N81-16058/2 PC **A07**/MF **A01**
Mississippi State Univ., Mississippi State. Engineering and Industrial Research Station.

Propeller Propulsion Integration, Phase 1.
Final Rept.,
G. Bennett, K. Koenig, S. J. Miley, J. Mcwhorter, and G. Wells. Feb 81, 131p NASA-CR-163921, MSSU-EIRS-ASE-81-4
Grant NSG-1402

A bibliography was compiled of all readily available sources of propeller analytical and experimental studies conducted during the 1930 through 1960 period. A propeller test stand was developed for the measurement of thrust and torque characteristics of full scale general aviation propellers and installed in the LaRC 30 x 60 foot full scale wind tunnel. A tunnel entry was made during the January through February 1980 period. Several propellers were tested, but unforseen difficulties with the shaft thrust torque balance severely degraded the data quality.

N81-16066/5 PC **A05**/MF **A01**
Kansas Univ./Center for Research, Inc., Lawrence.
The State of the ART of General Aviation Autopilots.
M. J. See, and D. Levy. Aug 80, 95p NASA-CR-159371
Contract NAS1-16255

The study is based on the information obtained from a general literature search, product literature, and visitations and interviews with manufacturers, users, and service centers. State of the art autopilots are documented with respect to total systems, components, and functions. Recommendations concerning potential areas of further research are also presented.

1D. Aircraft Flight Control and Instrumentation

AD-A094 888/5 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
Evaluation of the A-7 Requirements Document by Analysis of Change Data.
Interim rept.,
Victor R. Basili, and David M. Weiss. 29 Dec 80, 21p Rept no. NRL-8445

We describe in this report an effective data collection method for evaluating software development methodologies, from definition of the objectives of the data collection to analysis of the results. We show how the data analysis can answer questions with respect to how successfully the goals of the development methodology are met. The A-7 requirements document is used as an example. We provide the results of data analyses conducted partway through the A-7 flight software development cycle, and we discuss the utility of information obtained by such partial analyses. Results from the study show that data collection is feasible and useful when performed as part of configuration control, that data distributions based on partial data provided useful feedback to the developers, and that the A-7 requirements document is easily maintained and changed. (Author)

1E. Air Facilities

AD-A095 056/8 PC **A03**/MF **A01**
Federal Aviation Administration Technical Center, Atlantic City, NJ.
The Braking Performance of an Aircraft Tire on Grooved Portland Cement Concrete Surfaces.
Interim rept. Oct 77-Jul 79,
Satish K. Agrawal, and Hector Daiutolo. Jan 81, 44p FAA-CT-80-35, FAA-RD-80-78

Introduction of transverse grooves on runways improves braking and cornering performance of aircraft during operations in wet weather conditions and helps to alleviate hydroplaning. The Federal Aviation Administration (FAA) has recommended 1/4-inch square grooves spaced at 1-1/4 inches for installation on runways where the potential of hydroplaning exists. However, a large number of runways remain nongrooved. The major reasons are the high cost of groove installation and limited evidence as to the effectiveness of the grooved surfaces at the touchdown speeds of modern aircraft. The findings of the research described in this report indicate that by increasing the spacing of the conventional saw-cut grooves (in the portland cement concrete surfaces) up to 3 inches, groove installation cost can be reduced by up to 25 percent compared to the installation cost of grooves spaced at 1-1/4 inches. The results further show that the friction levels available on these grooves under wet operating conditions are not significantly below those attained on grooves spaced at 1-1/4 inches. These results are valid for operating speeds of up to 150 knots. The results also show that a reflex-percussive cutting process is an alternative groove installation technique that produces V-grooves which provide braking performance comparable to that of conventional saw-cut grooves. The installation cost of these alternative grooves can be substantially less than that of saw-cut grooves. (Author)

AD-A095 177/2 PC **A06**/MF **A01**
Transportation Systems Center, Cambridge, MA.
Analysis of Ground-Wind Vortex Sensing System Data from O'Hare International Airport.
Final rept. Jul 76-Sep 77,
T. E. Sullivan, J. N. Hallock, and B. P. Winston. Sep 80, 115p TSC-FAA-80-21, FAA-RD-80-133

From July 1976 through September 1977, aircraft wake vortex data were collected on the approach to runways 14R, 27R, and 32L at O'Hare International Airport. The vortices from over 21,000 aircraft were tracked using the propeller anemometer Ground-Wind Vortex Sensing System (GWVSS), and the vortex behavior was correlated with the associated ambient meteorological conditions. The primary purpose of the tests was the evaluation of the Vortex Advisory System (VAS) concept. The elliptical wind criterion used in the VAS was verified using the vortex data. (Author)

N81-16681/1 PC **A05**/MF **A01**
MCS, Inc., Boulder, CO.
An Airport Wind Shear Detection and Warning System Using Doppler Radar: A Feasibility Study.
J. Mccarthy, E. F. Blick, and K. L. Elmore. Jan 81, 95p NASA-CR-3379
Contract NAS8-33458

A feasibility study was conducted to determine whether ground based Doppler radar could measure the wind along the path of an approaching aircraft with sufficient accuracy to predict aircraft performance. Forty-three PAR approaches were conducted, with 16 examined in detail. In each, Doppler derived longitudinal winds were compared to aircraft measured winds; in approximately 75 percent of the cases, the Doppler and aircraft winds were in acceptable agreement. In the remaining cases, errors may have been due to a lack of Doppler resolution, a lack of co-location of the two sampling volumes, the presence of eddy or vortex like disturbances within the pulse volume, or the presence of point targets in antenna side lobes. It was further concluded that shrouding techniques would have reduced the side lobe problem. A ground based Doppler radar operating in the optically clear air, provides the appropriate longitudinal winds along an aircraft's intended flight path.

2. AGRICULTURE

2B. Agricultural Economics

PB81-148652 PC **A02**/MF **A01**
Foreign Agricultural Service, Washington, DC.
World Agricultural Supply and Demand Estimates.
15 Jan 81, 21p WASDE-111

Indicated 1980/81 world grain supplies are slightly above a month ago, primarily because the larger U.S. coarse grain crop offset a smaller crop in China. Prospective world use is up a little, with a higher forecast for U.S. grain feeding. Projected season-ending world grain stocks of about 150 million tons are down 2 million tons from a month ago, but 40 million below a year ago. Declines in world coarse grain stocks, nearly all occurring in the United States, accounted for about 80 percent of the decline in total grains stocks.

PB81-152415 PC **A03**/MF **A01**
Economics and Statistics Service, Washington, DC. Statistical Research Div.
Analysis of Crop Yield Trends and Development of Simple Corn and Soybean 'Straw Man' Models for Indiana, Illinois and Iowa.
Staff rept.,
Richard A. Kestle. Jan 81, 44p AGESS-810114

'Straw Man' linear regression crop yield models using time as the single independent variable were created for corn and soybeans at the crop reporting district and State levels in Indiana, Illinois, and Iowa. Since yield trends may shift over time, several approaches to finding the 'best fitting' model were evaluated, including simple one-line models, objectively selected 2- and 3-line segmented models, and models for which shifts in yield trends were systematically tested for 5- and 7-year groups of data. Comparisons of the models were based on relative percent differences of predicted 1979 yields from actual 1979 yields.

PB81-164501 PC **A04**/MF **A01**
Economics and Statistics Service, Washington, DC. National Economics Div.
Analyzing the Impact of Government Programs on Crop Acreage.
James P. Houck, Martin E. Abel, Mary E. Ryan, Paul W. Gallagher, and Robert G. Hoffman. Aug 76, 56p TB-1548

This study develops and applies the concept of 'effective support prices.' Government-announced price supports for agricultural crops adjusted to reflect the stringency of acreage controls imposed on growers as a condition for obtaining price supports. Effective support prices are used as a means of estimating the impact of Government programs on planted acreages of seven major U.S. field crops. Also, where applicable, the study shows that effective diversion rates are strongly but inversely related to plantings of the crops. Market price influences became increasingly important in the seventies.

2C. Agricultural Engineering

LA-8599-T PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
Micro-Level Land Use Impacts of Bioconversion.
V. K. B. Parsons. Nov 80, 94p
Contract W-7405-ENG-36
Thesis.

Implementation of the land intensive bio-energy technologies will involve actions that will impact existing land use at the local level. Due to the differences in crop type, yield per acre, existing land use conditions, and agricultural practices throughout the US, micro-level information is necessary. The local biomass potential is examined based on existing land use in seven countries in different agricultural regions throughout the US. These case studies serve as a basis for identifying the micro-level land use impacts of the bioconversion technologies. (ERA citation 06:007149)

PB81-147795 PC **A12**/MF **A01**
Nebraska Univ.-Lincoln. Center for Agricultural Meteorology and Climatology.
Remotely Sensed Crop Temperature for Water Resources Management.
Project completion rept. 1 Oct 77-30 Sep 80,

Bronson R. Gardner, Kirk L. Clawson, Norman J. Rosenberg, Darrell G. Watts, and Roberto E. Maurer. Nov 80, 267p W81-01002, OWRT-B-044-NEB(2)
Contract DI-14-34-0001-8097

The overall goal of the project was to evaluate the use of the crop temperature data as a tool in the management of water resources. The specific objectives of the study were: (1) to determine the crop temperature response of some major agronomic crops to various levels of water stresses; (2) to test methods based on crop temperature or other remotely sensed data to estimate crop water stress conditions and to evaluate the utility of these methods for their ability to estimate crop yields, severity of water stress and crop phenological development; and (3) to determine the feasibility of using crop temperature as a guide for irrigation scheduling.

PB81-159402 PC **A02**/MF **A01**
Universidad Centroamericana Jose Simeon Canas, San Salvador (El Salvador).
Modelo Matematico para Simulacion de Secado y Almacenamiento de Granos (A Mathematical Model for the Simulation of the Drying and Storage of Grain),
Jose Gerardo Merino Martell. Feb 79, 22p
Text in Spanish. Proceedings of the International Symposium of Engineering (2nd) Held at UCA, February 19-23, 1979.

The report describes a mathematical model for the simulation of the drying and storage of grain. .

2D. Agronomy and Horticulture

PB81-164493 PC **A03**/MF **A01**
Economics and Statistics Service, Washington, DC. Statistical Research Div.
Soybean Objective Yield Destructive Counting Study.
Staff rept.,
Dwaine C. Nelson. Dec 80, 45p AGESS-801218

This study examines the operational practicality of using a destructive counting procedure to obtain plan component counts for the soybean objective yield survey. The current procedure uses a nondestructive procedure to obtain these counts. The results presented here are based on the data collected in Illinois in 1978 and 1979, Arkansas in 1979, and Ohio in 1979. Comparisons of the plant component counts obtained from the two methods are made. The forecasting abilities of the two methods are also compared.

2E. Animal Husbandry

AD-A095 004/8 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Three Serologic Types of Adenovirus Infections of Owl Monkeys.
Final rept.,
Emerson L. Shroyer, Stephen T. Kelley, Peter C. Taylor, Peter Vanderloo, and Thomas L. Lester. 11 Sep 78, 7p Rept no. LAIR-79-048
Pub. in the American Jnl. of Veterinary Research, V40 n4 p532-536 1979.

No abstract available.

LA-8581-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
LASL/USDA Computer Applications Annual Progress Report, October 1, 1978-September 30, 1979.
W. M. Sanders, C. L. Campbell, P. A. Pickerill, H. R. Myers, and R. J. Payne. Oct 80, 20p
Contract W-7405-ENG-36

The Los Alamos Scientific Laboratory is funded by the US Department of Agriculture to apply scientific and computer technology to solve agricultural problems. This report summarizes work during the period October 1, 1978 through September 30, 1979 on the application of computer technology to four areas: (1) Texas brucellosis calfhood-vaccination studies, (2) brucellosis data-entry system in New Mexico, (3) Idaho adult vaccination data base, and (4) surveillance of slaughterplants in Texas. (ERA citation 06:008212)

PB81-159410 PC **A03**/MF **A01**
Universidad Centroamericana Jose Simeon Canas, San Salvador (El Salvador).
Potencial de la Ganaderia Tropical Tecnificada Bajo el Sistema del Pastoreo Rotativo Intensivo - Repercusion Social Y Economia (Potential of Tropical Breeding of Cattle by the Technical System of Intensive Rotation of Pastures),
Enrique Alvarez, Francisco Lino Osegueda, and Jauricio Rodriguez. Jul 80, 27p
Text in Spanish. Proceedings of the International Symposium of Engineering (2nd) Held at UCA on July 25-30, 1980.

This document presents a 26 year experience in beef production at Hacienda el Jobo, Departmento of Sonsonate, El Salvador. The document describes how the use of pasture maximized yields, and how appropriate management was implemented.

2F. Forestry

PAT-APPL-6-210 460 PC **A02**/MF **A01**
Department of Agriculture, Washington, DC.
Carriage for Cable Logging System.
Patent Application,
Cleveland J. Biller, and David D. Johnson. Filed 25 Nov 80, 16p PB81-162307
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The patent application relates to a skyline logging system wherein a skyline cable is supported at an intermediate location by an intermediate support assembly and a logging carriage is supported on the cable and is arranged to pass over the intermediate support assembly. The carriage has inwardly tapered pulleys which ride on oppositely bevelled tracks on the top edges of an upwardly-facing channel member forming part of the intermediate support assembly. The top edges have ramp-like end portions. The carriage is lifted off the cable and rides on the bevelled tracks when crossing over the intermediate support assembly. The carriage can tilt laterally relative to the intermediate support assembly while riding on the bevelled tracks because of the lateral movability of the tapered pulleys on the oppositely bevelled tracks, whereby to maintain stability during passage of the carriage over the intermediate support.

PB81-152027 PC **A05**/MF **A01**
Wyoming Univ., Laramie. Water Resources Research Inst.
Water Movement Through Stands of Lodgepole Pine Forest in Wyoming.
Project completion rept.,
Dennis H. Knight, and Timothy J. Fahey. Nov 80, 82p W81-01175, OWRT-B-036-WYO(1)
Contract DI-14-34-0001-7202

Contents: Transpiration from 100-yr-old Lodgepole Pine forests estimated with whole-tree potometers; The effect of night frost on the transpiration of Pinus contorta sp. latifolia; The relative effect of stand structure, soil and certain environmental factors on water outflow from Pinus contorta forest.

3.
ASTRONOMY AND ASTROPHYSICS

3A. Astronomy

AD-A095 087/3 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Coordinates of Features on the Galilean Satellites,
Merton E. Davies, and Frank Y. Katayama. Jun 80, 39p Rept no. RAND/P-6479
Contract NASW-3210

One product of the current exploration of the solar system is the publication of maps of those bodies with solid surfaces. These maps show the relative positions of topographic features, one-to-another, and are used as bases for correlating a variety of measurements and pictorial data and for regional geologic mapping. In order to produce a map of a planetary surface, it is necessary to first establish a coordinate system for the body and then to determine the latitudes and longitudes of topographic features in this coordinate system. It is the purpose of this paper to define the coordinate systems of each of the Galilean satellites and to present coordinates of features seen in the Voyager pictures of these satellites. The two Voyager encounters with Jupiter are described in Smith et al. (1979a,b). A preliminary report on the progress of the control nets of the Galilean satellites was published by Davies et al. (1979). (Author)

3B. Astrophysics

N81-16643/1 PC **A02**/MF **A01**
Big Bear Solar Observatory, Big Bear City, CA.
Reversed-Polarity Regions.
F. Tang. Dec 80, 24p NASA-CR-163913, BBSO-0199
Contract NAGW-27

The 58 RPRS studied have a lifespan comparable to normal active regions and have no tendency to rotate toward a more normal alignment. They seem to have stable configurations with no apparent evidence suggesting stress due to their anomalous magnetic alignment. Magnetic complexity in RPRs is the key to flare productivity just as it is in normal regions - weak field RPRs produced no flares and regions with complex spots produced more flares than regions with noncomplex spots by a factor of 5. The RPRs however, differ from normal regions in the frequency of having complex spots, particularly the long lived complex spots, in them. Less than 17 percent of normal ARs have complex spots; less than 1.8 percent have long lived complex spots. In contrast, 41 percent of RPRs have complex spots and 24 percent have long lived complex spots.

N81-16960/9 PC **A10**/MF **A01**
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
Submillimeter Wave Survey of the Galactic Plane.
Ph.D. Thesis - Maryland Univ.
L. H. Cheung. Dec 80, 223p NASA-TM-82056

The survey measured, over virtually the entire galactic plane, the distribution and basic physical conditions of the coolest dust component of the interstellar medium. The instrument designed for observations of extended, low surface brightness continuum emission consisted of a balloon borne, gyro stablized, 1.2 m Cassegrain telescope and a

liquid cooled photometer. The design, integration, tests, and flight operation of the survey are presented.

N81-16962/5 PC **A06**/MF **A01**
Planetary Science Inst., Pasadena, CA.
Photogeological Constraints on Lunar and Planetary Vulcanism, Part 1.
Final Report, 7 Dec. 1978 - 7 Dec. 1979.
Nov 79, 106p NASA-CR-163901
Contract NASW-3051

Central volcanic constructs were studied as constraints on the thermal evolution and regional tectonics of the Moon and terrestrial planets. The origins of sub-kilometer lunar craters were examined with regards to implications for mare basalt petrogenesis. The morphology, distribution, age, and tectonic setting of the volcanic constructs were studied using Viking Orbiter data.

N81-16963/3 PC **A06**/MF **A01**
Planetary Science Inst., Pasadena, CA.
Photogeological Constraints on Lunar and Planetary Vulcanism, Part 2.
Final Report, 7 Dec. 1978 - Dec. 1979.
5 Dec 80, 120p NASA-CR-163902
Contract NASW-3051

The use of several simple theoretical modelling approaches in simulating lava erosion were evaluated. Both one dimensional and two dimensional models were used with the two dimensional model being superior. The two dimensional model accounts, in a purely phenomenological way, for the effects of turbulence and mechanical erosion in a flow. Criteria for mechanical erosion was related to the basal stress and the effect of entrained eroded material on fluid properties was parameterized.

N81-16964/1 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
The Comet Halley Handbook: An Observer's Guide.
D. K. Yeomans. 15 Jan 81, 49p NASA-CR-163876

The orbit of Comet Halley is described as well as its expected physical behavior (brightness, tail lengths, coma diameters) in 1985-1986 during which time its preperihelion positon will allow better conditions for Northern Hemisphere observers. Southern Hemisphere observers will prefer post perihelion observation. Ephemeris data for 1981-1987 are presented in tables.

N81-16965/8 PC **A02**/MF **A01**
California Univ., Los Angeles. Dept. of Astronomy.
The Solar Gravitational Figure: J2 and J4.
Final Rept.,
R. K. Ulrich, and G. W. Hawkins. 1980, 12p
NASA-CR-163881, JPL-9950-459
Contract JPL-955839
Prepared for JPL.

The theory of the solar gravitational figure is derived including the effects of differential rotation. It is shown that J sub 4 is smaller than J sub 2 by a factor of about 10 rather than being of order J sub 2 squared as would be expected for rigid rotation. The dependence of both J sub 2 and J sub 4 on envelope mass is given. High order p-mode oscillation frequencies provide a constraint on solar structure which limits the range in envelope mass to the range 0.01 M sub E/solar mass 0.04. For an assumed rotation law in which the surface pattern of differential rotation extends uniformly throughout the convective envelope, this structural constraint limits the ranges of J sub 2 and J sub 4 in units of 10 to the -8th power to 10 J sub 2 15 and 0.6 -J sub 4 1.5. Deviations from these ranges would imply that the rotation law is not constant with depth and would provide a measure of this rotation law.

N81-16966/6 PC **A05**/MF **A01**
Lockheed Missiles and Space Co., Inc., Sunnyvale, CA.
The Lockheed OSO-8 Program. Task 2: Analysis of Data from the High Resolution Ultraviolet Spectrometer Experiment.
Final Rept., 19 Nov. 1977 - 31 Aug. 1980.
E. C. Bruner, Jr.. 30 Sep 80, 80p NASA-CR-163918, LMSC-D766867
Contract NAS5-22411

The complete set of C 4 time sequences generated by the University of Colorado high resolution ultraviolet spectrometer experiment on OSO-8 were examined in a comprehensive and systematic fashion. As a result a new limit is placed on the acoustic flux passing through the transition zone of the Sun's atmosphere. It is found to be three orders of magnitude too small to heat the corona, and is consistent with zero. In collaborative efforts, the properties of transient C 4 brightenings were examined in considerable detail.

N81-16971/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
Interpretations and Implications of gamma Ray Lines from Solar Flares, the Galactic Center in gamma Ray Transients.
R. Ramaty, and R. E. Lingenfelter. Nov 80, 40p NASA-TM-82066
Grant NSG-7541, Contract NSF AST-79-11987
Submitted for Publication. Presented at the Roy. Soc. Meeting on gamma Ray Astronomy, 27-28 Nov. 1980.

Observations and theories of astrophysical gamma ray line emission are reviewed and prospects for future observations by the spectroscopy experiments on the planned Gamma Ray Observatory are discussed.

PB81-160921 Not available NTIS
National Bureau of Standards, Washington, DC.
Outer Atmospheres of Cool Stars. V. IUE Observations of Capella: The Rotation-Activity Connection.
Final rept.,
T. R. Ayres, and J. L. Linsky. 1 Oct 80, 21p
Contract NAS5-23274, Grant NGL-06-003-057
See also PB80-178387.
Pub. in Astrophysical Jnl. 241, n1 p279-299, 1 Oct 80.

Ultraviolet spectra of Capella (G6 III plus F9 III), obtained with the International Ultraviolet Explorer, is presented and analyzed. High-dispersion spectra in the 1150-2000 A region taken at orbital velocity crossing show no evidence for the increasing blueshifts with increasing temperature of formation previously inferred from Copernicus observations. We conclude that there is no discernible stellar wind from either component of the system.

PB81-804072 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Quasars, Pulsars, and Black Holes. 1964-January, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Jan 81.
Feb 81, 313p
Supesedes PB80-804339, and NTIS/PS-79/0076.

Astronomical studies of quasars, pulsars, and black holes are cited. Computer simulations, mathematical models, and other methods used for the verification of hypotheses about astrophysical processes are included. (This updated bibliography contains 306 citations, 39 of which are new entries to the previous edition.)

PB81-857179 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Blackbody Radiation. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 100p NERACSPNNT2740

This retrospective bibliography contains citations concerning the detection, measurement, analysis, and interpretation of blakbody radiation from various sources ranging from black holes to stellar objects to blackbody cavities. Theoretical and experimental considerations and some attention to simulation are included. (Contains 100 citations, fully indexed and including a table of contents.)

PB81-858342 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Astrophysical Balmer Emission Lines. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 187p NERACSPNNT2962

This retrospective bibliography contains citations concerning observations, analyses, and interpretations of Balmer emission lines from supernova remnants, cosmic gases, planetary nebulae, and from various types of galaxies, stars (including the sun), and quasi-stellar objects. Consideration is also given to Balmer lines in synthesizing spectral features for star models. (Contains 171 citations, fully indexed and including a table of contents.)

PB81-858953 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cassiopeiae. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 85p NERACSPNNT2805

This retrospective bibliography contains citations concerning observations, analyses, and interpretations of electromagnetic and gas emissions from Cassiopeiae. The nature of the sources and the properties and effects of the propagation media are considered both theoretically and mathematically. (Contains 85 citations, fully indexed and including a table of contents.)

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

AD-A094 721/8 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Return Wave Analysis in a Thermally Bloomed Medium.
Master's thesis,
Michael Thomas Baker. Dec 80, 67p Rept no. AFIT/GEO/PH/80-2

A computer code was developed to perform a geometrical ray trace of a light ray from a target plane to a receiver plane via a thermally bloomed medium. Thermal blooming was modeled using a computer code from the Air Force Weapons Laboratory called PROPMD. Ray traces were done for various degrees of thermal blooming, and Strehl ratios were made for each situation. Also, contour plots of the ray optical path deviations across the receiver plane were made. Results showed that a ray's direction of propagation was virtually unaffected by refraction. Disturbance of the ray was due totally to the effect of thermal blooming on the optical path length of the ray. In severe blooming situations, calculated Strehl ratios were less than 0.1. However, limiting the size of the high-energy beam grid led to improved Strehl ratios. (Author)

AD-A094 723/4 PC **A03**/MF **A01**
Naval Research Lab., Washington, DC.
Nonlinear Theory and Experimental Observations of the Local Collisional Rayleigh-Taylor Instability in a Descending Equatorial Spread-F Ionosphere.
Memorandum rept.,
M. J. Keskinen, E. P. Szuszczewicz, S. L. Ossakow, and J. C. Holmes. 8 Jan 81, 39p Rept no. NRL-MR-4399

The nonlinear evolution of the local collisional Rayleigh-Taylor instability in downward-moving equa-

torial F layers has been studied in a coordinated theoretical and experimental program dealing with actual conditions of bottomside spread F. For ambient bottomside electron density gradient scale lengths L=8 and 25 km, we find large percentage depletions and inverse power law spatial power spectra over the intermediate wavelength range wavelength=25 m-1 km. In addition we outline a nonlinear theory of the collisional Rayleigh-Taylor instability applicable to an upward or downward moving equatorial F region ionosphere. These results represent the first definitive comparison between experiment and theory with their agreement lending further support to the belief that the collisional Rayleigh-Taylor instability is responsible for large scale size irregularities that occure under conditions of equatorial spread F.

AD-A094 795/2 PC **A02**/MF **A01**
Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
Ozone Measurements to 48 Km with Chemiluminescent Ozone Detectors.
Annual progress rept. 15 Nov 79-15 Jan 81,
James M. Rosen, and D. J. Hofmann. Jan 81, 5p
Rept no. AP-62
Contract N00014-76-C-0170

An airborne ozone measuring system was flown to 48km on a large light weight balloon. Excellent data was obtained throughout the flight and the results indicate that this may be an effective method of obtaining ozone profiles to high altitudes. (Author)

AD-A094 809/1 PC **A05**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
Solar Eclipse (1979). Part II. Initial Results for Ionization Sources, Electron Density, and Minor Neutral Constituents.
Final rept.,
Melvin G. Heaps, Robert O. Olsen, K. D. Baker, D. A. Burt, and L. C. Howlett. Oct 80, 79p Rept no. ERADCOM/ASL-TR-0069
See also Part 1, AD-A087 318.

The 26 February 1979 solar eclipse provided a unique opportunity to investigate the properties of the middle atmosphere and lower ionosphere. This event served as the focal point of a cooperative field measurements program involving the US Army Atmospheric Sciences Laboratory, the Air Force Geophysics Laboratory, the National Aeronautics and Space Administration (Wallops Flight Center), and the National Research Council of Canada. This report surveys the initial data and findings of the two Army sponsored Nike-Orion rockets launched during the eclipse period. Measurements were provided of electron density, ionization sources, and critical minor constituents. The electron density profile showed a rather broad peak near 100 km with a maximum density of about 200,000 1 cc. Measurements of ionization sources confirm the fact that during the eclipse period a particle precipitation event was in progress that largely dominated the ionization in the D and E regions.

AD-A094 823/2 PC **A05**/MF **A01**
Scientex Corp., Washington, DC.
An Analysis of the Vertical Distribution of Ozone in the Atmosphere.
Final rept.,
Allen G. Hansen, and Stephen J. Padgett. 31 Dec 80, 91p TSC-11-1, NRL-MR-4398
Contract N00173-80-M-3579

An analysis of vertical ozone distributions in the atmosphere is presented in tabular and graphical form for altitudes up to 25 kilometers. Histograms and concentrations probabilities are used to quantify the ozone distribution. The analysis is limited to the consideration of the probabilities of ozone concentration occurrence obtained by lumping the data for all times and locations. Limitations are discussed, and recommendations are made with regard to further analysis for the determination of concentration variations with location and time. (Author)

AD-A094 836/4 PC **A03**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
One-Dimensional Cloud Microphysical Models for Central Europe and Their Optical Properties.
Final rept.,
Richard D. H. Low. Oct 80, 43p Rept no. ERADCOM/ASL-TR-0070

One-dimensional microphysical models for six different cloud types are proposed. These models were formulated by making use of Khrgian-Mazin's one-parameter modified gamma distribution to judiciously mate the Russian measurements of cloud liquid water content and mean radius profiles to the German observations of various cloud types. With the drop-size spectra of the clouds thus determined as a function of height, calculation of their optical properties became straightforward. Separate regression relationships were established for the six model clouds, giving liquid water content and mean radius as a function of height above the cloudbase by the method of least-squares fit. It is from these relationships that the drop-size distribution may be derived for any level in a cloud of interest, and hence its spectral extinction coefficients at any wavelengths, in turn, from the distribution. A close examination of these coefficients in the visible and infrared window regions for each of the cloud types revealed that as a function of height they were well represented by polynomial relationships of 3 to 6 degrees. Regression coefficients for these relationships are presented in three separate tables. The six one-dimensional model cloud types proposed herein may fill the gap which has long been felt in the modeling community and which is also found in our present electro-optical systems atmospheric effects library. (Author)

AD-A094 866/1 PC **A03**/MF **A01**
Naval Research Lab., Washington, DC.
Field Comparisons of Pyrotechnically Generated Fogs.
Memorandum rept.,
S. G. Gathman, B. G. Julian, R. K. Markson, and J. Sedlacek. 18 Feb 81, 43p Rept no. NRL-MR-4443

Comparisons between some physical characteristics of water fogs produced in several ways from pyrotechnically generated hygroscopic nuclei are presented. These results were obtained from a series of 31 plume experiments off Nantucket during 8-12 June 1979. The comparisons include the maximum scattering of the fogs at optical wavelengths, the duration of the fogs and the detection of larger droplets in the fogs. The results show that significant physical properties of the resultant water fogs can be modified by both the production process and/or the chemical formulation of the pyrotechnic material. (Author)

AD-A094 926/3 PC **A02**/MF **A01**
Air Force Geophysics Lab., Hanscom AFB, MA.
Seasonal and Geomagnetic Control of Equatorial Scintillations in Two Longitudinal Sectors,
J. Aarons, J. P. Mullen, J. P. Koster, R. F. daSilva, and J. R. Medeiros. 20 Jul 79, 8p Rept no. AFGL-TR-81-0013
Pub. in Jnl. of Atmospheric and Terrestrial Physics, v42 p861-866 1980.

No abstract available.

AD-A094 927/1 PC **A02**/MF **A01**
Air Force Geophysics Lab., Hanscom AFB, MA.
Looking Down on the Aurora from Space,
Charles P. Pike, and Elmo H. Gardner. 1980, 8p Rept no. AFGL-TR-81-0014
Pub. in Astronautics and Aeronautics, v19 n1 p64-70 Jan 81.

No abstract available.

AD-A095 033/7 PC **A03**/MF **A01**
Naval Research Lab., Washington, DC.
Spread F Theories - A Review.
Memorandum rept.,
S. L. Ossakow. 30 Jan 81, 48p Rept no. NRL-MR-4435

Our understanding of equatorial spread F (ESF) phenomena has increased dramatically over the past few years: notwithstanding the fact that it was discovered over four decades ago (BOOKER and WELLS, 1938) as diffuse echoes on ionograms. Much of this advancement in understanding comes from a combined theoretical and experimental approach to the problem. Advances in radar backscatter measurements, satellite and rocket in situ measurements, and theoretical and numerical simulation techniques have provided a clearer picture of the fundamental mechanisms causing ESF. The study of ESF phenomena has been both complicated and enriched by the fact that the attendant magnetic field aligned ionospheric irregularities span some 5-6 orders of magnitude in scale sizes. The present paper will deal with ESF theory and at that only those theories using plasma mechanisms as a basis. Experimental reviews of the subject can be found in other papers in this edition. An examination is made of the basic equatorial nighttime ionospheric F region geometry.

AD-A095 046/5 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
Physical Mechanism of the Lower-Hybrid-Drift Instability in a Collisional Plasma.
Memorandum rept.
J. D. Huba, and S. L. Ossakow. 30 Jan 81, 23p Rept no. NRL-MR-4432

During the past several years, high-frequency radar backscatter experiments have revealed a spectrum of short-wavelength (i.e., below the ion gyroradius) irregularities during equatorial spread F (ESF). Radar backscatter observations at 50 MHz, 155 MHz and 415 MHz indicate density fluctuations exist with scale sizes of 3m, 1m, and 36 cm, respectively FARLEY et al., 1970; WOODMAN and LAHOZ, 1976; COSTA and KELLEY, 1978a,b; HUBA et al., 1978. Most recently, TSUNODA (1980) has observed radar backscatter from 11 cm (1320 MHz) irregularities during equatorial spread F at high altitudes, using the TRADEX radar. These observations were part of a coordinated Defense Nuclear Agency campaign at Kwajalein to study ionospheric irregularities during equatorial spread F. Sharp density gradients were observed during this campaign (M. C. KELLEY, private communication, 1980) and have been observed during past equatorial spread F events (COSTA and KELLEY, 1978a,b). The scale lengths of these gradients range from tens of meters to several hundred meters and are presumably due to primary longer wavelength instabilities such as the Rayleigh-Taylor instability. Based upon the above evidence, it has been suggested that various drift instabilities are responsible for the short wavelength irregularities HUBA et al., 1978; COSTA and KELLEY, 1978a,b; HUBA and OSSAKOW, 1978a,b, depending upon the wavelength observed.

AD-A095 129/3 PC **A03**/MF **A01**
Battelle Columbus Labs., OH.
Partial Reflection Experiment: Operational and Data Reduction Techniques.
Final rept.,
W. A. Flood. Oct 80, 31p ERADCOM/ASL-CR-80-0100-4
Contract DAAG29-76-D-0100
Prepared in cooperation with North Carolina State Univ., Raleigh.

Operational and analytical procedures for reducing D-region partial reflection data obtained at White Sands Missile Range (WSMR) were reviewed and analyzed with the expectation that this equipment would be used to deduce D-region electron density profiles during the total solar eclipse of 26 February 1979 in Canada. The procedures devised as the result of this study are applicable to data obtained during the eclipse at a Canadian site as well as to data obtained during longer term operation at WSMR. (Author)

AD-A095 149/1 PC **A02**/MF **A01**
Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
The Influence of Aerosols on the Electrical Parameters in the Free Atmosphere.
Final rept. 1 Jan 77-31 Dec 80,
J. M. Rosen, and D. J. Hofmann. Jan 81, 6p
ARO-14048.5-GS
Grant DAAG29-77-G-0046

A comparison of all past measurements of the vertical profile of the small ion concentration shows

that there is a significant discrepancy between observers. The research described here centered around resolving these disagreements which at first was thought due to the presence of aerosols. The problem was attacked by developing a reliable ion counter and then obtaining simultaneous ion density and aerosol profiles. In addition an international workshop was held for the purpose of simultaneously comparing the many instruments and techniques used in atmospheric electrical measurements. (Author)

N81-16514/4 PC **A03**/MF **A01**
Environmental Research and Technology, Inc., Concord, MA.
Analysis of GOES Imagery and Digitized Data for the SEV-UPS Period, August 1979.
Final Rept.,
C. J. Bowley, H. H. K. Burke, and J. C. Barnes.
Feb 81, 35p NASA-CR-165656, A-533F
Contract NAS1-16109

In support of the Southeastern Virginia Urban Plume Study (SEV-UPS), GOES satellite imagery was analyzed for the month of August 1979. The analyzed GOES images provide an additional source of meteorological input useful in the evaluation of air quality data collected during the month long period of the SEV-UPS experiment. In addition to the imagery analysis, GOES digitized data were analyzed for the period of August 6 to 11, during which a regional haze pattern was detectable in the imagery. The results of the study indicate that the observed haze patterns correspond closely with areas shown in surface based measurements to have reduced visibilities and elevated pollution levels. Moreover, the results of the analysis of digitized data indicate that digital reflectance counts can be directly related to haze intensity both over land and ocean. The model results agree closely with the observed GOES digital reflectance counts, providing further indication that satellite remote sensing can be a useful tool for monitoring regional elevated poilution episodes.

N81-16644/9 PC **A08**/MF **A01**
Ocean Data Systems, Inc., Monterey, CA.
Atmospheric Analysis Modeling in Support of Seasat.
Final Technical Report.
R. A. Langland, and P. L. Stephens. Nov 78, 164p NASA-CR-160086
Contract NAS5-24469

Atmospheric objective analysis models were developed and tested in preparation for assessing the utility of Seasat data. Of the several discretionary procedures in such computer programs, the effects of three were examined and documented: (1) the effect of varying the weights in the pattern conserving techniques; (2) the effect of varying the data influence region; (3) the effect of including wind information in analysis of mass-structure variables. The problem of inserting bogus reports is also examined.

N81-16972/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Problems of Sampling and Radiation Balances: Their Problematics.
D. Crommelynck. Jun 80, 18p NASA-TM-75831, ESA-SP-150
Contract NASW-3198
Transl. Into English of "Problemes d'Echantillonnage et Bilans Radiatices--Leur Problematique" Rept. Esa-SP-150 (France), Paris, Feb. 1980 p 95-102. Transl. By Scientific Translation Service, Santa Barbara, Calif. Original DOC. Prep. By European Space Agency, Paris. Presented at an Esa Workshop on Climatol., Hydrol., Atmospheric Res. And Meteorol., Ajaccio, Corsica, 12-15 Nov. 1979.

Problems associated with the measurement of the Earth radiation balances are addressed. It is demonstrated that the knowledge of the different radiation budgets with their components is largely dependent on the space time sampling of the radiation fieid of the Earth atmosphere system. Whichever instrumental approach is adopted (wide angle view of high resolution) it affects the space time integration of the fluxes measured directly or calculated. In this case the necessary knowledge of the reflection pattern depends in addition on the angular sampling of the radiances. A series of questions is considered, the answers of which are a prerequisite to the the organization of a global observation system.

ORNL/EIS-108/V1 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Carbon Cycles and Climate: A Selected Bibliography.
J. S. Olson, L. J. Allison, and B. N. Collier. May 80, 42p
Contract W-7405-ENG-26

This partially annotated bibliography contains the first 1000 references from a computerized file of literature on the global ecological implications of carbon cycles and climatic changes. Many early citations originated from the Biogeochemical Ecological Information Center established at Oak Ridge National Laboratory in 1968 and from profiles of computerized files such as Government Research Abstracts (GRA) and Biological Abstracts (BA). Later citations have been extracted from the open literature through 1978 and early 1979, from government reports and impact statements, and from profiles of GRA, BA, and the Energy Data Base of the Department of Energy Technical Information Center, Oak Ridge, Tennessee. The subject categories covered by this bibliography may be divided into two main topics: carbon cycling and climate system analysis. Volume I contains an introduction and overview. (ERA citation 05:026301)

PB81-156903 PC **A03**/MF **A01**
Atmospheric and Environmental Research, Inc., Cambridge, MA.
Potential Atmospheric Impact of the Explosive Vapor Taggant Perfluorohexylsulfur Pentafluoride.
Final rept.,
M. K. Ko, N. D. Sze, M. B. McElroy, and S. C. Wofsy. Jul 79, 38p
Sponsored in part by Aerospace Corp., Washington, DC.

A study was performed to investigate the impact on the stratosphere from the release of perfluorohexyl-sulfur pentafluoride (L-4412, CF3(CF2)5SF5) in the atmosphere. It was found that L-4412 is removed from the atmosphere by its reaction with 0(1D) and by photolysis, which plays a more important role. A release rate of .00002 lb/yr of L-4412, that increase by 6% per year for 25 years and maintains a constant release rate in subsequent years, can give rise to a tropospheric mixing ratio of about 0.4 ppt (parts per trillion) within 300 years. Decomposition of L-4412 provides the stratosphere with a source for fluorine and sulfur atoms. The fluorine atoms can catalyze recombination of O with O3 leading to a possible O3 reduction. The calculations showed that the magnitude of this effect is small, about 6 orders of magnitude less than the impact predicted for chlorofluorocarbons, which accounts for 15 percent ozone reduction. The sulfur atoms released from L-4412 could provide additional sulfur sources in the stratosphere leading to possible enhancement of the sulfate aerosol layer. Our calculation showed that this particular source is about 3 orders of magnitude less than other known sulfur sources. It should be pointed out that in the present analysis, the parameters (e.g., quantum yield of F and S atom release) were chosen to represent the maximum fluorine and sulfur impact. Thus, the results reported here may be interpreted as the worst case scenario regarding O3 and climate perturbations. Recommendations for further research on other possible climatic impacts due to L-4412 release are presented.

PB81-803850 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Air Pollution Tracer Studies in the Lower Atmosphere. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 227p
Supersedes PB80-804487, and NTIS/PS-79/0099.

The cited reports cover research on the use of tracers to study lower atmospheric air pollution movements. The tracer used include sulfur hexafluoride, krypton 85, carbon 14, and other radioactive isotopes. The studies cite the results and techniques used, tracer movement from nuclear power plants, industrial stacks, urban areas, and the detectors used in their measurement. (This updated bibliography contains 220 citations, 23 of which are new entries to the previous edition.)

PB81-859696 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Magnetospheric Resonances. January, 1972-January, 1981 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Jan 81.
Feb 81, 104p NERACIAANT3222

This retrospective bibliography contains citations concerning theories, investigations, and analyses of the resonance properties and resonant phenomena of the terrestrial magnetosphere resulting from magnetospheric configurations, from particle and plasma motions, and from propagating magnetoacoustic and magnetohydrodynamic waves. Various resonance mechanisms and interactions are considered. (Contains 101 citations, fully indexed and including a table of contents.)

TRITA-EPP-79-22 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden).
Rocket Measurements of Electric Fields, Electron Density and Temperature During the Three Phases of Auroral Substorms.
G. Marklund, L. Block, and P. A. Lindqvist. Dec 79, 29p
U.S. Sales Only.

On Jan. 27, 1979, three rocket payloads were launched from Kiruna, Sweden, into different phases of two successive auroral substorms. Among other experiments, the payloads carried the RIT double probe electric field experiments, providing electric field, electron density and temperature data, which are presented here. These are discussed in association with observations of particles, ionospheric drifts (STARE) and electric fields in the equatorial plane (GEOS). The motions of the auroral forms, as obtained from auroral pictures, are compared with the E x B/B exp 2 drifts and the currents calculated from the rocket electric field and density measurements with the equivalent current system deduced from ground based magnetometer data. (Atomindex citation 11:546601)

4B. Meteorology

AD-A094 668/1 PC **A09**/MF **A01**
Naval Oceanography Command Center/Joint Typhoon Warning Center, FPO San Francisco 96630.
Annual Tropical Cyclone Report 1980.
Rept. for Jan-Dec 80.
1980, 189p

Annual publication summarizing the tropical cyclone season in the western North Pacific, Bay of Bengal and Arabian Sea. A brief narrative is given on each significant tropical cyclone including the best track. All reconnaissance data used to construct the best tracks are provided. Forecast verification data and statistics for the JTWC are summarized. Research efforts at the JTWC and NEPRF are discussed briefly. (Author)

AD-A094 818/2 PC **A03**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
An Empirical Model of the Vertical Structure of German Fogs.
Final rept.,
Louis D. Duncan, James D. Lindberg, and Radon B. Loveland. Nov 80, 35p Rept no. ERADCOM/ASL-TR-0071

Data available from balloon-borne measurements of fog particle size distributions were analyzed to develop an empirical model of the vertical structure of german fogs. The data base consisted of approximately two dozen profiles collected Gra-

fenwohr and Meppen, Germany. Curve fitting procedures were applied to the results of liquid water content calculations and extinction coefficients calculations to develop single algorithms. Tables are included to show comparisons of the model outputs with the original data. (Author)

AD-A094 828/1 PC **A03**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
Evaluation of the Environmental Instruments, Incorporated Series 200 Dual Component Wind Set.
Research and development technical rept. May 77-Mar 78,
W. J. Vechione. Sep 80, 50p Rept no. ERADCOM/ASL-TR-0067

Tests of atmospheric parameter measurements using the EII Series 200 Dual Component Wind Set with integral pressure and temperature sensors were made during the period of May 1977 through March 1978. These tests included laboratory comparison, wind tunnel, and field operation tests. Data collected with the sensor were compared to calibrated standards. Presented in this report are all tabulated and graphic representation as well as field operation results. The results of the test show the systems relative comparison with the calibrated standards of temperature and pressure. Wind measurements became more comparable with increasing windspeeds. A method of utilizing the entire windspeed capability range of the sensor is proposed. (Author)

AD-A094 832/3 PC **A02**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
19311C MLRS, Missile Number V18-003, Round Number V132/DF5, 17 December 1980.
Meteorological data rept.
Dec 80, 15p Rept no. ERADCOM/ASL-DR-1166

Meteorological data gathered for the launching of the 19311C MLRS, Missile No. V18-003, Round No. V132/DF5 presented in tabular form. (Author)

AD-A094 838/0 PC **A02**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
19311C MLRS, Missile Number V18-001, Round Number V-128/DF-1, 6 November 1980.
Meteorological data rept.
Nov 80, 23p Rept no. ERADCOM/ASL-DR-1161

Meteorological data gathered for the launching of the 19311C MLRS, Missile Number V18-001, Round Number V128/DF-1 presented in tabular form. (Author)

AD-A094 840/6 PC **A02**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
19310AT MLRS, Missile Number V18-005, Round Number V130/DF-3, 20 November 1980.
Meteorological data rept.
Dec 80, 18p Rept no. ERADCOM/ASL-DR-1163

Meteorological data gathered for the launching of the 1931OAT MLRS, Missile Number V18-005, Round Number V130/DF-3 presented in tabular form. (Author)

AD-A094 841/4 PC **A02**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
19311A MLRS, Missile Number V18-002, Round Number V-131/DF-4, 5 December 1980.
Meteorological data rept.
Dec 80, 20p Rept no. ERADCOM/ASL-DR-1164

Meteorological data gathered for the launching of the 19311A MLRS, Missile Number V18-002, Round Number V131/DF-4 presented in tabular form. (Author)

AD-A094 842/2 PC **A02**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
19311A MLRS, Missile Number V18-004, Round Number V-129/DF-2.
Meteorological data rept.
Nov 80, 14p Rept no. ERADCOM/ASL-DR-1162

Meteorological data gathered for the launching of the 19311A MLRS, Missile Number V18-004, Round Number V-129/DF-2 are presented in tabular form. (Author)

AD-A094 877/8 PC **A02**/MF **A01**
Air Force Geophysics Lab., Hanscom AFB, MA.
The Shape of Raindrop Spectra for Different Situations and Averaging Periods,
V. G. Plank, R. O. Berthel, and L. V. Delgado.
1980, 7p Rept no. AFGL-TR-81-0008
Pub. in Communications a la VIIIeme Conference Internationale sur la Physique des Nuages, p173-176 15-19 Jul 80.

No abstract available.

AD-A094 908/1 PC **A04**/MF **A01**
Weather Wing (2nd), APO New York 09012.
Terminal Forecast Reference Notebook for Bitburg AB, Germany.
Final rept.
4 Feb 81, 53p Rept no. 2WW/TFRN-81/001
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

Contents: Location and Topography; Climatic Aids; Rule of Thumb; Weather Control.

AD-A095 158/2 PC **A08**/MF **A01**
Army Engineer Topographic Labs, Fort Belvoir, VA.
Terrain Analysis Procedural Guide for Climate,
Roland J. Frodigh. Sep 80, 161p Rept no. ETL-0247
Includes Climate Data Sheets.

This procedural guide provides the Army Terrain Analyst with the methods and procedures necessary to generate a thematic or factor overlay with supportive tables for portraying climate. Seven potential sources of information are considered: climatic summaries; climatic studies and climatic atlases; geographic studies and atlases; maps (climatic); technical literature; aerial photography; and maps (topographic). Procedures for extracting climatic information (data elements) from these sources are presented. Appendices provide the analysts with additional sources of information. (Author)

DOE/EV/10097-2 PC **A04**/MF **A01**
Brown Univ., Providence, RI. Dept. of Geological Sciences.
Global Temperature Patterns 6000 Years Ago. Progress Report.
T. Webb III. Nov 80, 61p
Contract AC02-79EV10097

Climatic patterns of the mid-Holocene (5000 to 7000 years B.P.) may be helpful in predicting some of the climatic changes during future climatic periods that are warmer than today. Research progress is reported on work done during the year to assemble data from pollen, marine plankton, and lake-levels required for producing northern hemisphere climatic maps for the mid-Holocene. (ERA citation 06:008116)

N81-16515/1 PC **A05**/MF **A01**
Ocean Weather, Inc., White Plains, NY.
Simulation Studies of the Application of Seasat Data in Weather and State of Sea Forecasting Models.
Final Rept.,
V. J. Cardone, and J. A. Greenwood. Oct 79, 94p NASA-CR-160085
Contract NAS5-24498

The design and analysis of SEASAT simulation studies in which the error structure of conventional analyses and forecasts is modeled realistically are presented. The development and computer implementation of a global spectral ocean wave model is described. The design of algorithms for the assimilation of theoretical wind data into computers and for the utilization of real wind data and wave height data in a coupled computer system are presented.

N81-16678/7 PC **A06**/MF **A01**
Texas A and M Univ., College Station. Dept. of Meteorology.
Atmospheric Structure Determined from Satellite Data.
K. S. Knight, and J. R. Scoggins. 1981, 107p NASA-RP-1071, M-328
Contract DAAG29-76-G-0078
Sponsored in Part by NASA.

The capabilities of the Nimbus 6 satellite sounding data for use in synoptic analysis were considered and interpreted. An evaluation of the ability of the satellite sounding data to detect and depict structural features of the atmosphere was made on the basis of vertical profiles of average difference and standard deviation of differences between satelite and rawinsonde data at nine pressure levels from 850 to 100 mb; and constant pressure charts and cross sections of satellite, rawinsonde and difference values. Results indicate that satellite measurements of temperature as well as the vertical lapse rate and horizontal gradient of temperature are accurate enough to show large scale patterns but not to precisely define fronts or tropopauses; satellite measurements of dew point temperature are smoothed enough to severely reduce contrasts between air masses across fronts; the magnitude of the standard deviation of differences between rawinsonde and satellite data for most variables increases with the synoptic activity in the region; and the most reliable variables to examine from satellite data for depiction of synoptic features are the temperature equivalent potential temperature and mixing ratio.

N81-16679/5 PC **A05**/MF **A01**
Texas A and M Univ., College Station. Dept. of Meteorology.
Comparisons Between Nimbus 6 Satellite and Rawinsonde Soundings for Several Geographical Areas.
N. M. Cheng, and J. R. Scoggins. 1981, 76p NASA-RP-1073, M-330
Contract DAAG29-76-G-0078
Sponsored in Part by NASA.

Good agreement between satellite and weighted (linearly interpolated) rawinsonde temperature and temperature derived parameters was found in most instances with the poorest agreement either near the tropopause region or near the ground. However, satellite moisture data are highly questionable. The smallest discrepancy between satellite and weighted mean rawinsonde temperature and parameters derived from temperature was found over water and the largest discrepancy was found over mountains. Cumulative frequency distributions show that discrepancies between satellite and rawinsonde data can be represented by a normal distribution except for dew point temperature.

N81-16680/3 PC **A04**/MF **A01**
Dayton Univ., OH
Case Studies of Clear Air Turbulence Using the Diagnostic Richardson Number Tendency Formulation.
Final Report.
J. L. Keller, and P. A. Haines. Jan 81, 62p NASA-CR-3378, UDR-TR-80-97
Contract NAS8-32111

The results of four case studies of clear air turbulence (CAT) using the diagnostic Richardson number tendency (DRT) formulation are highlighted. The performance of this technique in resolving regions of documented CAT encounters is encouraging. Its operational adaptability appears particularly attractive in that input data can be supplied by the currently operational rawinsonde system. Two CAT indices are calculated deterministically, sensing synoptic scale changes in static stability and vertical wind shear conductive for supporting mesoscale CAT layers. These two indices reveal volumes of the troposphere which act as source regions for patches of CAT. The first, the time to reach the critical Richardson number necessary for the initiation of turbulent conditions, was first used by Oard (1974). A second index is devised which is an adaptation of Roach's (1970) work relating synoptic scale and mesoscale energetical coupling and gives more information on the relative intensity of these source regions. The output from the DRT computer module highlights specific

regions of the atmosphere which can be interpreted operationally in terms of a CAT encounter probability.

N81-16683/7 PC **A07**/MF **A01**
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
Energy-Balance Climate Models.
G. R. North, R. F. Cahalan, and J. A. Coakley, Jr. Sep 80, 148p NASA-TM-82047
Submitted for Publication Sponsored in Part by NSF.

An introductory survey of the global energy balance climate models is presented with an emphasis on analytical results. A sequence of increasingly complicated models involving ice cap and radiative feedback processes are solved and the solutions and parameter sensitivities are studied. The model parameterizations are examined critically in light of many current uncertainties. A simple seasonal model is used to study the effects of changes in orbital elements on the temperature field. A linear stability theorem and a complete nonlinear stability analysis for the models are developed. Analytical solutions are also obtained for the linearized models driven by stochastic forcing elements. In this context the relation between natural fluctuation statistics and climate sensitivity is stressed.

N81-16684/5 PC **A04**/MF **A01**
City Coll., New York.
Investigation of Models for Large-Scale Meteorological Prediction Experiments.
Final Rept.,
J. Spar. 31 Jan 81, 56p NASA-CR-163870
Contract NGR-33-016-086

An attempt is made to compute the contributions of various surface boundary conditions to the monthly mean states generated by the 7 layer, 8 x 10 GISS climate model (Hansen et al., 1980), and also to examine the influence of initial conditions on the model climate simulations. Obvious climatic controls as the shape and rotation of the Earth, the solar radiation, and the dry composition of the atmosphere are fixed, and only the surface boundary conditions are altered in the various climate simulations.

N81-16685/2 PC **A02**/MF **A01**
Morgan State Coll., Baltimore, MD.
Assessment of the Quality of GATE Area Rainfall Data from a Nimbus-5 Radiometer.
Final Report.
N. Knox, and R. R. Cottrell. Feb 81, 18p
Contract NAG5-14

The quality of rainfall intensity estimates derived from passive microwave measurements by the electrically scanned microwave radiometer (ESMR-5) aboard the Nimbus 5 satellite are evaluated. The microwave measurements used are those coincident with the global atmospheric research program Atlantic tropical experiment (GATE). The ESMR 5 derived rainfall intensity estimates are compared with hourly averaged GATE radar rainfall measurements. It is determined from the transfer curves derived using the radar measurements as ground truth, that the ESMR 5 derived data consistently over estimates rainfall by a factor of approximately 1.4.

PB81-139933
(Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
A Split Method to Solve Equations of Weather Prediction,
Zeng Qingcun, and Yuan Chongguang. 29 Jan 79, 5p
Included in Scientia Sinica, v25 n12 p1005-1009 Dec 80.

The so-called 'split method' is to split a complex process into two or more simpler processes, and add them together after separate computations. This method will simplify the computing logic and save computation time. Its theoretical basis is the divisibility of a physical process. Here the authors choose the barotrophic primitive equations in weather prediction as an example.

PB81-139941
(Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
Characteristics of Northeast China Cold Summer and Global Air Temperature,
Zhang Mingli, Fu Congbin, Zeng Zhaomei, Peng Xiaoxia, and Guo Jialin. 9 Nov 79, 4p
Included in Scientia Sinica, v25 n12 p1010-1013 Dec 80.

During the last two decades, a serious cold summer disaster occurred every three or four years in Northeast China, which greatly reduced the grain production of the region. However, the cold weather in Northeast China is not a local, temporary phenomenon, but the reflection of a global climatic anomaly. The authors selected four anomalous years during the 1970's, the years 1972 and 1976, that had the typical cold summers in Northeast China, and the years 1975 and 1978 that had warm summers in the same region. To illustrate the typical patterns of the cold and warm summers, the authors have analyzed the global temperature departure fields for these four summers.

PB81-139966
(Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
A Possible Scheme for Improving Vertical Resolution and Accuracy of Satellite Temperature Retrieval,
Zhao Gaoxiang. 25 Mar 80, 6p
Included in Scientia Sinica, v25 n12 p1019-1024 Dec 80.

Valuable data of atmospheric temperature profiles on a global scale can be obtained by remote sensing from satellites. At present, however, owing to the limitations of the vertical resolving power of satellite radiation measurements, generally only the main characteristics, but not the fine structure, of the vertical temperature structure of the atmosphere can be obtained. Hence, how to improve the vertical resolving power of the satellite temperature measurement becomes one of the chief problems to be considered by atmospheric scientists.

PB81-153371 PC **A02**/MF **A01**
Water and Power Resources Service, Denver, CO. Office of Atmospheric Resources Management.
Project Skywater Data Management Users Guide,
Gerard E. Klazura. Jul 80, 25p

Project Skywater is a comprehensive research program designed to develop additional water supplies by cloud seeding techniques. This paper describes the history, objectives, philosophy, activities, and responsibilities of data management in support of Project Skywater. The influences of data management are discussed in terms of the total program structure which includes contractual requirements; annual work plans; data collection, reduction, and processing; data inventory; and data archival and retrieval.

PB81-159253
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
The Cnoidal Waves of Rotating Barotropic Atmosphere,
Chao Jiping, and Huang Ruixin. 6 Dec 79, 12p
Included in Scientia Sinica, v23 n10 p1266-1277 Oct 80.

It is shown that, in consideration of beta-effect, the conservation equation of potential vorticity can be reduced to a KdV equation satisfied by the nonlinear perturbation in a polar coordinates. The dynamic characteristics of the cnoidal waves in rotating barotropic atmosphere are discussed. In certain situations the wave form similar to cut-off low results.

SERI/SP-755-789 PC **A13**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Insolation Data Manual: Long-Term Monthly Averages of Solar Radiation, Temperature, Degree-Days and Global Anti K/sub T/ for 248 National Weather Service Stations.
C. L. Knapp, T. L. Stoffel, and S. D. Whitaker. Oct 80, 294p
Contract AC02-77CH00178

Monthly averaged data is presented which describes the availability of solar radiation at 248 National Weather Service stations. Monthly and annual average daily insolation and temperature values have been computed from a base of 24 to 25 years of data. Average daily maximum, minimum, and monthly temperatures are provided for most locations in both Celsius and Fahrenheit. Heating and cooling degree-days were computed relative to a base of 18.3 exp 0 C (65 exp 0 F). For each station, global anti K/sub T/ (cloudiness index) were calculated on a monthly and annual basis. (ERA citation 06:007119)

SOLAR/0010-79/07 PC **A10**/MF **A01**
IBM Federal Systems Div., Huntsville, AL.
Environmental Data for Sites in the National Solar Data Network.
Jul 79, 205p
Contract AC01-77CS34049

Data collected and analyzed to determine the thermal performance of selected solar energy systems are presented. The data include: solar insolation, ambient temperature, wind speed, and relative humidity. (ERA citation 06:007120)

SOLAR/0010-80/11 PC **A11**/MF **A01**
Automation Industries, Inc., Silver Spring, MD. Vitro Labs. Div.
Environmental Data for Sites in the National Solar Data Network.
Nov 80, 233p
Contract AC01-79CS30027

Data collected and analyzed in order to determine the thermal performance of selected solar energy systems are presented. The data include: solar insolation, ambient temperature, wind speed, and relative humidity. (ERA citation 06:007121)

5.

BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

AD-A094 657/4 PC **A03**/MF **A01**
Army Inventory Research Office, Philadelphia, PA.
Annual Report - Fiscal Year 1980.
Final rept. Oct 79-Oct 80.
Dec 80, 36p

This report describes work done by the US Army Inventory Research Office during the period October 1979 - September 1980. Reports published during the period are listed, along with papers presented at professional meetings and notes on other professional activities. (Author)

AD-A094 667/3 MF **A01**
Office of Naval Research, Arlington, VA.
Naval Research Logistics Quarterly. Volume 27, Number 4.
Dec 80, 181p
Availability: Superintendent of Documents, GPO, Washington, DC 20402 HC$3.25. Microfiche furnished to DTIC (and NTIS) users.

Contents: Storage Problems when Demands is 'All or Nothing'; Reliability Growth of Repairable Sys-

tems; On the Distribution of the Optimal Value for a Class of Stochastic Geometric Programs; A Class of Continuous Nonlinear Programming Problems with Time-Delayed Constraints; Equalities in Transportation Problems and Characterizations of Optimal Solutions; A Network Flow Approach for Capacity Expansion Problems with Two Facility Types; Solving Multifacility Location Problems Involving Euclidean Distances; An Easy Solution for a Special Class of Fixed Charge Problems; The Bounded Interval Generalized Assignment Model; The M/G/1 Queue with Instantaneous Bernoulli Feedback; An Inventory Model with Search for Best Ordering Price; The United States Cost Guard Computer-Assisted Search Planning System (CASP); Concentrated Firing in Many-Versus-Many Duels; Spike Swapping in Basis Reinversion; An Alternative Proof of the IFRA Property of Some Shock Models; New and Memoranda; Corrigendum; Index to Volume 27.

AD-A094 681/4 PC **A04**/MF **A01**
Army Procurement Research Office, Fort Lee, VA.
Improving Productivity and Reducing Cost through Capital Investment Incentives.
Final rept.,
Wayne V. Zabel, and Duane D. Knittle. Dec 80, 56p Rept no. APRO-80-07

Sagging productivity and productive capacity are contributing to cost increases and are jeopardizing the capability of the defense industrial base to meet defense requirements. The Department of Defense recognizes that contractor investment in plant modernization could result in increased productivity and cost reduction. The Weighted Guidelines Technique (WGL) for profit determination has been revised to consider profit on capital, and a number of other acquisition techniques and contract provisions are available for use as motivators for contractor capital investments. The objectives of this study were to determine (1) the relationship between capital investment expenditure levels and productivity; (2) which conditions, if any, preclude WGL's from being a sufficient motivator; (3) the current use and success of multi-year procurement, award fee, value engineering, and special termination buy back provisions as motivators for capital investment; and to recommend alternative strategies and tactics which may be capable of stimulating contractor investment.

AD-A094 693/9 PC **A05**/MF **A01**
Institute for Defense Analyses, Arlington, VA. Cost Analysis Group.
On Estimating the Cost Growth of Weapon Systems.
Final rept. 1 Nov 79-30 Jun 80,
Norman J. Asher, and Theodore F. Maggelet. Jun 80, 81p IDA-P-1494, IDA/HQ-80-22466, AD-E500 237
IDA Independent Research.

This paper documents schedule and cost growth in current major DoD weapon system acquisition programs that have attained Initial Operational Capability (IOC). Utilizing Selected Acquisition Report data, a methodology for projecting probable future growth in evolving systems that have not yet reached IOC was developed and described. Use of the growth projection methodology as an adjunct to future IDA weapon system analyses is recommended.

AD-A094 709/3 PC **A05**/MF **A01**
General Accounting Office, Washington, DC. Procurement and Systems Acquisition Div.
Controlling Federal Costs for Coal Liquefaction Program Hinges on Management and Contracting Improvements.
4 Feb 81, 90p Rept no. GAO/PSAD-81-19
Report to the Congress of the United States.

GAO's review of the H-Coal and Exxon projects showed inadequacies in DOE's contracting practices and a failure by DOE to properly plan, manage, and monitor, especially the H-Coal project. The initial Government-industry H-Coal agreements regarding the level of investment by private sponsors and the ceilings imposed on sharing in cost growth were imbalanced. Larger investments by private sponsors and sharing of cost growth provides an incentive to private sponsors to control costs and helps to assure that each party is fully committed to the success of the project. DOE started the H-Coal project prematurely before sufficiently detailed designs were available and without adequate project planning for functions such as construction scheduling, materials handling, inventory systems, and quality control. DOE staffing was inadequate at both projects to effectively monitor progress and contribute to timely decisions. Its contracts for the H-Coal plants were poorly written and administered. DOE plans for two large demonstration plants need careful review and attention in light of escalating cost and the risks involved in scaling up to the 6,000-ton-a-day facilities.

AD-A094 830/7 PC **A05**/MF **A01**
RAND Corp., Santa Monica, CA.
The Soviet Academy of Sciences and Technological Development,
Simon Kassel, and Cathleen Campbell. Dec 80, 80p Rept no. RAND/R-2533-ARPA
Contract MDA903-78-C-0189, ARPA Order-3520

This report examines the impact of the Academy of Sciences on the development of technology in the Soviet Union. It finds that the future of Soviet technology depends significantly on the Academy and that severe problems stemming from its nature and its relationship with Soviet industry encumber the Academy's ability to serve Soviet technology. The Academy's importance derives from its unique position of national leadership in planning, coordinating, and performing R&D and from the fact that it is expected to help solve the problems affecting Soviet industrial innovation. The Academy's statutes identify it as a scientific institution dedicated to the independent pursuit of knowledge, i.e., basic research. However, the Academy's effective contribution to technological development requires a substantial departure from the statutory mission of basic research in favor of more-or-less direct involvement with industry, particularly in the successive stages of the research, development, and innovation (RDI) cycle. (Author)

AD-A094 852/1 PC **A03**/MF **A01**
California Univ., Los Angeles. Western Management Science Inst.
Production and Sales Planning with Limited Shared Tooling at the Key Operation. Revision.
Working paper,
Gerald G. Brown, Arthur M. Geoffrion, and Gordon H. Bradley. Jul 80, 29p Rept no. WMSI-WP-300-REV
Contract N00014-75-C-0570
Revision of report dated Feb 80.

The focus of this paper is multiperiod production and sales planning when there is a single dominant production operation for which tooling (dies, molds, etc.) can be shared among parts and is limited in availability. Our interest in such problems grew out of management issues confronting an injection molding manufacturer of plastic pipes and fittings for the building and chemical industries, but similar problems abound in the manufacture of many other cast, extruded, molded, pressed, or stamped products. We describe the development and successful application of a planning model and an associated computational approach for this class of problems. The problem is modeled as a mixed integer linear program. Lagrangean relaxation is applied so as to exploit the availability of highly efficient techniques for minimum cost network flow problems and for single-item dynamic lot-sizing type problems. For the practical application at hand, provably good solutions are routinely being obtained in modest computing time to problems far beyond the capabilities of available mathematical programming systems. (Author)

AD-A094 938/8 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
On Military RDT&E in Israel,
Alvin Jay Harman. Feb 80, 21p Rept no. RAND/P-6452

This paper does not attempt to fully analyze all aspects of Israeli RDT&E; it has been deliberately limited to the pre-Yom Kippur War military RDT&E experience. It has attempted to abstract from individual instances of success or failure to provide an overview description of processes--especially focusing on the formulation of operational requirements, execution of development and operational testing, and the interactions of the technical and user communities.

AD-A094 939/6 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Where Did the Money Go.
Jan M. Chaiken, and Warren E. Walker. Mar 80, 5p Rept no. RAND/P-6454

In fiscal year (FY) 1973 the budget of the city of Los Angeles was $627 million. By the year before Proposition 13 (FY 1978) it has grown to $1028 million. How was the additional $401 million spent. This was the question we addressed in a recent Rand study. The study was encouraged by Councilman Marvin Braude, Chairman of the Finance and Revenue Committee, who felt an understanding of how the city's budget had grown prior to the passage of Proposition 13 would help him develop effective policy alternatives for the post-Proposition 13 world. As part of the study, we thought it would be illuminating to calculate how much it would cost in 1978 to provide the same services the city provided in 1973. From this we could figure out--we thought--how much was being spent on services that had recently been added.

AD-A095 043/6 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Resource Allocation and Defense Planning in Retrospect and Prospect,
Charles Wolf, Jr. Jun 79, 15p Rept no. RAND/P-6330-1

The title of this paper is formidable, and probably pretentious, in scope. The first part of the topic, 'Resource Allocation,' embraces literally all of defense economics. The second part, 'Defense Planning,' if interpreted literally, covers strategic forces, doctrines, and targeting; general purpose forces and their employment; defense research, development and systems acquisition; command, control and communications, the effects of SALT II and other arms control agreements on all of the foregoing; and so forth. Furthermore, the combination of 'resource allocation' and 'defense planning' implicitly covers other special policy issues, as well. For example, such issues as arms transfers, and the structure, scale, and role of overseas bases and deployments of U.S. Forces, in NATO, Korea, and the Philippines, also come within the topic, because they involve the allocation of defense resources. Even an issue as remote as U.S. export control policies legitimately comes within the purview of resource allocation and defense planning. For example, U.S. exports of computer technology may affect Soviet capabilities, and hence influence U.S. defense planning and resource allocations.

AD-A095 053/5 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Remarks on (a) Towards a Normative Theory of Organization Design Control and (b) A Game Theoretic Account of Social Justice,
Alain A. Lewis. Feb 80, 19p Rept no. RAND/P-6398

A critical review of two papers in the subject of the Theory of Games by W. H. Brock of S.R.I. is provided. The framework of comparison employs the Hempel concept of a formal model (qua theory) to construct a partial order on deductive explanans - explandum schemata. In addition, a comparison is made between the works in question and existing theory on the subject. (Author)

AD-A095 081/6 PC **A04**/MF **A01**
RANN, Inc., Palo Alto, CA.
Exploratory Study of the Organization and Management of Hazard Mitigation in the Civil Air Transport System,
C. W. Harper, B. A. Smith, J. D. Young, R. L. Bisplinghoff, and P. G. Dembling. 26 Jan 81, 71p
Contract EMW-1-4112

This exploratory study suggests that organization and management principles and procedures for hazard mitigation derived from the long experience with this objective in the air civil transport system may prove of great value in the development of hazard mitigation activities associated with other major technological systems of national concern. Cited in the report are examples where difficulties may have already arisen from non-observance of some of these principles and where difficulties may arise in future endeavors if these principles are not observed. (Author)

AD-A095 083/2 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
User Charges, Contracting Out, and Privatization in an Era of Fiscal Retrenchment,
Anthony H. Pascal. Apr 80, 13p Rept no. RAND/P-6471

The fiscal limitation movement, aggravated by other trends in local and intergovernmental finance, appears to be hastening an era of fiscal retrenchment. Local government will search for ways to reduce government costs and to raise revenues not subject to fiscal controls. User charges, contracting out and privatization are obvious remedies. The advantages of these market-oriented mechanisms on the efficiency front, however, must be balanced against the inequities they may create. Certain adjustments in the application of the mechanisms can reduce the adverse distributional consequences.

AD-A095 088/1 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Contacting and Interviewing Residential Electricity Customers,
Sandra H. Berry. Mar 80, 18p Rept no. RAND/P-6483

This paper discusses issues which are likely to arise in planning the job of contacting and interviewing residential electricity customers. An obvious point should be made at the outset: since nearly all households consume electricity, the large amount of information about ordinary household interviewing is also relevant to the topic at hand. This paper refers to the research findings about regular household interviewing in a general way and concentrates on issues that are specific to surveys of electricity customers. Much of what follows is drawn from the author's experience with the Electricity Rate Study (ERS) which took place in Los Angeles. This experiment was designed to test the effects of different rate structures (and of variations within each type of rate) on household electricity use. As part of the study, about 2,600 electricity customers were interviewed for a pre-experimental, baseline survey in the summer of 1976. Personal interviews were conducted by employees of the Los Angeles Department of Water and Power (LADWP), under the author's supervision. The same interviewers also enrolled 1,800 customers in 30-month experimental electricity rate plans. To complete the data collection, two additional telephone surveys were carried out at the midpoint and conclusion of the rate experiment on the panel of households who participated.

AD-A095 103/8 PC **A05**/MF **A01**
DAMANS and Associates, Inc., Rockville, MD.
Survey of Small Businesses: Issues in Metric Planning and Conversion.
Final rept. 1979-1980,
Mary Foote, and Sampson O. Annan. Dec 80, 100p
Contract AA-79-SAC-N2131

A mail survey of randomly chosen 2500 small business firms covering five groups (manufacturing, construction, transportation, wholesale trade, and retail trade), selected as representative of a population of about 725,000 firms, was conducted in 1980. About 500 firms could not be located; of the remainder, about 1100 (55 percent) responded with useful data. (Author)

AD-A095 116/0 PC **A02**/MF **A01**
United States Metric Board, Arlington, VA.
Five Years After the Metric Conversion Act, Where Do We Stand.
Dec 80, 13p

A mail survey of randomly chosen 202 of the 1000 largest manufacturing and mining firms, as listed by Fortune magazine, was conducted in late 1979 and early 1980. About 64 percent (112 firms) responded with useful data. This Executive Summary draws on the full report (U.S. Metric Board 1979 Survey of Selected Large U.S. Firms and Industries, Lisa King, King Research, Inc., May 1980; AD-A-091-518) and provides an overview of the study's findings. Some selected findings are: (1) About 30 percent of the large firms produce at least one hard metric product; (2) About 48 percent of foreign sales are of metric products; (3) Little corporate coordination and planning seems to accompany conversion to the metric system; (4) About one-third of the firms see laws and regulations as impeding conversion; (5) Over 50 percent see lack of customers demand as inhibiting conversion; (6) The most realistic time period for conversion is 10 years, the minimum time for conversion (under pressure) is three years, and the preferred time (at the firm's own pace) is eight years. (Author)

HEDL-SA-1826-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Performance Measurement System: Recent Systems Development and Applications.
R. A. Rigney. 28 Mar 79, 15p CONF-790988-1
Contract EY-76-C-14-2170
Internet international Management System Association meeting, Garmisch-Partenkirchen, F.R. Germany, 24 Sep 1979.

The Performance Measurement System (PMS), a system for managing a given project or program, is described; this system incorporates the value earned for work accomplished approach. Development and application of this system is discussed under the following headings: PMS vs conventional management control systems; PMS implementation on a project/program; PMS data elements (organization, planning and budgeting, accounting, analysis, reports, and performance measurement data elements); recent PMS applications (FFTF, CRBRP, FMEF, and FMIT); and future of PMS. 25 references, 6 figures, 3 tables. (ERA citation 05:003168)

N81-16974/0 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Annual Report by Aerospace Safety Advisory Panel.
Annual Report.
1980, 57p NASA-TM-82250

Elements of the shuttle program that directly affect the mission success and crew safety were investigated. These elements included the shuttle orbiter, the main engine, the solid rocket boosters, avionic system, ground support equipment and the approach and landing operations. The thermal protection systems were studied in detail. Crew training and ground simulation test procedures were reviewed.

PB81-148801 PC **A03**/MF **A01**
Council for Community Development, Inc., Cambridge, MA.
Providing Capital to Small Businesses: An Evaluation of State Development Incentives.
Final rept.,
Belden Hull Daniels, and Harry Lirtzman. 11 Nov 80, 50p
Contract SBA-4894-OA-80

The study explains how a state government can make creative use of industrial revenue bonds to finance small, not large enterprises and how to do so in ways that meet the legitimate concerns of federal policy-makers who properly see the current misuse of federally tax-exempt state bonds as an unnecessary drain on the Treasury.

PB81-151417 PC **A04**/MF **A01**
Confederated Salish and Kootenai Tribes of the Flathead Reservation, Pablo, MT.
Management and Operations Study, Dixon Post and Pole Yard.
Sep 80, 73p EDA-81-012
Grant EDA-05-06-01895
Prepared by Butler Research and Engineering Co., St. Paul, MN.

The Salish and Kootenai Tribes of the Flathead Reservation own and operate a post, pole and fence manufacturing facility at Dixon, Montana. The Post and Pole Yard purchases lodgepole pine timber from Tribal members in varied precut lengths. The Yard produces posts and rails for exterior fencing. The Yard also produces small dimension lumber. The Tribe with the assistance of EDA funding, commissioned this study to review current management and operations to make improvements in view of planned expansion.

PB81-152092 PC **A03**/MF **A01**
Rand Afrikaans Univ., Johannesburg (South Africa).
Motivational Structure and the Transfer of Technology,
Hilgard S. Schoeman. Feb 79, 39p
Sponsored in part by Universidad Centroamericana Jose Simeon Canas, San Salvador (El Salvador). Proceedings of the International Symposium of Engineering Held at UCA on February 19-23, 1979.

The paper describes a number of case studies drawn largely from the self-governing territory of Garzankulu (South Africa). It outlines and defines the motivational structure of rural Tsonga. The Garzankulu data shows that development experts, particularly those concerned with the transfer of technology require an adjustment of perspectives. It underlines that the transfer of technology should not be a conflict between different kinds of technology, but a scientifically programmed fusion of them.

PB81-152340 PC **A23**/MF **A01**
Columbia Univ., New York. Center for the Social Sciences.
Federalism in Canada and West Germany: Lessons for the United States.
Final rept. 30 Jun 76-30 Jun 79,
William A Glaser, and Allen H. Barton. Jun 79, 543p NCHSR-81-47
Grant PHS-HS-02453

The United States has enacted many programs in health in collaboration with state governments. But considerable conflict, waste, and overload occur. The situation might be even more difficult if the national government devolves more domestic programs on the states, as some propose. The research examines how two other major federal countries--Canada and West Germany--manage relations between national and provincial governments. Methods of making decisions and monitoring the implementation of programs through joint national-provincial conferences were studied in all three countries.

PB81-155079 PC **A10**/MF **A01**
National Opinion Research Center, Chicago, IL.
The Measurement of the Attitudes of the U.S. Public Toward Organized Science.
Final rept.,
Jon D. Miller, and Kenneth Prewitt. 4 Jan 79, 220p NSF-SIU-79-2
Grant NSF-SRS78-16839
See also report dated 1977, PB-278 745.

The report presents and explains a new questionnaire for the use of the National Science Foundation in conducting national surveys of public attitudes toward science and technology. The Science Indicators Unit of NSF's Division of Science Resources Studies commissioned this study to aid them in preparing the National Science Board's Science Indicators reports. A survey questionnaire was required that would explore important science policy issues in accordance with current knowledge about public attitudes toward science and technology and current survey methods. The resulting questionnaire will be used in a series of national opinion surveys beginning in 1979, which are intended to be the basis of chapters in successive Science Indicators reports.

PB81-172231 PC **A09**/MF **A01**
Transportation Systems Center, Cambridge, MA.
Improving Railroad Technology. A Directory of Research and Development Projects of the Federal Railroad Administration.
1980, 193p FRA/ORD-81/14

The FRA's Research and Development program has as its goals near-term improvements in products and processes which would enhance safety, improvements in the economic viability and efficiency of the Nation's railroad operations, and reduction of adverse environmental effects of railroad operations. The Office of Research and Development has responsibility for three major programs: (1) Track, Equipment and Personnel Safety, (2) Railroad Operational Improvements, and (3) Improved Passenger Systems. The Track, Equipment, and Personnel Safety Program is aimed at redueing the number and severity of rail-

road-related accidents. The Railroad Operational Improvement Program is aimed at improving freight classification and switching yards, promoting the exchange of technology and information between railroad companies, improving intermodal equipment, facilities and operations, and conserving energy. The Improved Passenger Systems Program is designed to emphasize train technology and subsystem development.

5B. Documentation and Information Technology

AD-A094 673/1 PC **A04**/MF **A01**
Naval Research Lab., Washington, DC.
Summer 1980 Directory of Navy Electro-Optical Professionals.
5th Edition,
Manuel R. Pablo. 19 Jan 81, 71p Rept nos. NRL-MR-4442, EOTPO-SR-48
Supersedes Rept. no. EOTPO-SR-48, AD-A083 388.

The first directory of electro-optical professionals in the Navy was published in July 1974. This fifth edition is the current update and revision of that document. Names are grouped by Navy Command or facility. (Author)

AD-A095 032/9 PC **A09**/MF **A01**
Advisory Group for Aerospace Research and Development, Neuilly-sur-Seine (France).
Manual of Documentation Practices Applicable to Defence-Aerospace Scientific and Technical Information. Volume III. Section 7. Information Retrieval. 8. Dissemination Practices. 9. Microform Systems and Reprography,
S. C. Schuler. Oct 80, 193p Rept no. AGARD-AG-235-VOL-3
See also Volume 2, AD-A075 242.

The purpose of this Manual is to describe in a series of separately-published Volumes the basic documentation practices which are involved in the initial setting up, and subsequent operation of an Information-Library Organisation to provide defence-aerospace scientific and technical information services. The manual is primarily intended for the main defence-aerospace information centres in the smaller nations, and the specialised defence establishments and defence contractors in the larger NATO countries. For those information centres which already have a well-developed system, the manual may prove helpful in the work of analyzing and evaluating existing system performance, or in revising an ineffective system. An important subsidiary objective is therefore to encourage the greater use of modern techniques of information processing. The manual endeavours to meet the needs of a wide spectrum of readers - the senior man concerned with setting up a new system, as well as junior staff who may be using the manual as a training aid. The various Sections aim to focus on the problems and techniques associated with processing unpublished reports and related information, rather than conventional book-journal libraries. Emphasis is on practical solutions and, where appropriate, useful operating suggestions. The manual has been planned by the AGARD Technical Information Panel and consists of four Volumes comprising twelve Sections in all, each prepared by a well-known expert in the field. The Publication Layout is given on the following page and publication of the final Volume including an Index to all four volumes is scheduled for 1981. (Author)

AD-A095 101/2 PC **A02**/MF **A01**
Corps of Engineers, Seattle, WA. Seattle District.
In-House Information System (IHIS) Study/ Project Report.
Final rept. Nov 78-Mar 80,
Ellen M. Traxel, Mary K. Pritchard, and Nancy E. Taghon. Oct 80, 25p

Lack of a systematic information policy in the Seattle District Army Corps of Engineers resulted in inefficient use of internal information and staff time. After the problem was analyzed by the District's library staff, an in-house computerized information storage and retrieval system was tested. A sample of in-house reports was indexed and input into the local Harris computer utilizing FAMULUS software. The final analysis of the sample determined that the FAMULUS software was insufficient to manipulate the large file. The study team recommended that the purchase of large file, bibliographic oriented software be made to allow a larger file size and more sophisticated searching capabilities. (Author)

AD-A095 126/9 PC **A06**/MF **A01**
Office of Naval Research Scientific Liaison Group, APO San Francisco 96503.
ONR Tokyo Scientific Bulletin. Volume 5, Number 3, July-September 1980,
Rudolph J. Marcus, and Mary Lou Moore. Sep 80, 105p
See also Volume 5, Number 2, AD-A089 991.

Contents: First International Workshop on the Marine Flora and Fauna of Hong Kong and Southern China; Aquatic Scientists in Taiwan; The New Laboratories of the Geochemical Research Division, Meteorological Research Institute, Tsukuba Science City; Dental Research Conferences in Japan; Biofeedback Research in Japan; R and D News Items on Electronic Materials in Japan; ANZAAS Jubilee Congress; Five Departments of Physics in New Zealand; The Physics Department, University of Hong Kong; International Meetings in the Far East 1980-1983; The Eighth International Liquid Crystal Conference; The First Regional Meeting for Burn Injuries in Japan; Sixth International Conference on Liquefied Natural Gas.

AD-A095 137/6 PC **A03**/MF **A01**
Pittsburgh Univ., PA. Learning Research and Development Center.
Retrieving Information about Locations.
Technical rept.,
James G. Greeno, Maria E. Magone, Alexander W. Siegel, and James J. Mokwa. 26 Jan 81, 44p Rept no. TR-6
Contract N00014-78-C-0022

In experiments measuring latencies to answer questions about relative locations, Lea (1975) supported a hypothesis that locations are represented in a list ordered according to adjacency relations, and Hintzman, O'Dell, and Arndt (1979) supported a hypothesis that distances and directions between objects are represented. We propose a hypothesis that locations are represented using a spatial schema, and that procedures for answering questions include processes that operate on positions in the spatial schema. We hypothesize further that different performance observed by Hintzman et al and Lea can be interpreted as a difference of retrieval procedures induced by differences in the ways that questions were presented. We conducted an experiment in which different questions were asked in different conditions about locations of objects, where the tasks were comparable in ways that Hintzman et al's task and Lea's task were not. Latencies in the two conditions differed in the same way as the earlier findings, lending support to the hypothesis of different retrieval procedures induced by differences in the question-answering tasks. (Author)

AD-A095 178/0 PC **A04**/MF **A01**
Naval Research Lab., Washington, DC.
Records Systems of the Naval Research Laboratory: Central Records and Directives System Records.
Memorandum rept.,
D. K. Allison. 24 Feb 81, 63p Rept no. NRL-MR-4464

This report results from the first phase of a comprehensive study of all archival records systems of the Naval Research Laboratory. The report describes two major archival collections: the central records of the Laboratory, which are managed by the Records and correspondence Management Branch, and the records of NRL Directives--official policy declarations--which are managed by the Administrative Management Section. The aim of the report is to explain what constitutes the collections, how they are organized, and how they may best be used. (Author)

AECL-6366 PC **A07**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Progress Report, Physics Division, July 1 to September 30, 1978.
Oct 79, 130p PR-P-119
U.S. Sales Only.

Preparations are underway to use the intense electron beam produced by the Electron Test Accelerator for an experiment to test for violation of parity conservation in strong interactons. Using a capture gamma -ray technique, the thermal neutron capture cross section of exp 90 Zr has been found to be significantly smaller than previous literature values. Commissioning of the Fast Intense Neutron Source to increase source strength has continued with some delay caused by the failure of the target rotating vacuum seal. The superconducting cyclotron program passed from full-scale test to construction phase. Design work is continuing and component fabrication has been started on a preaccelerator suitable for accelerator breeder applications. Development is continuing on a multi-aperture duoPIGatron ion source suitable for a high current accelerator. In fertile-to-fissile conversion experiments at TRIUMF, all of the neutron flux data taken previously at a proton energy of 480 MeV have been re-assessed. Experiments in solid state physics included (a) using small-angle scattering techniques for examination of detergent micelles in D sub 2 O solution, (b) the nature of phase transitions in two specimen antifluorites, (c) phonons in a large single crystal of deuterated ammonia, (d) vacancy formation energy in type 316 stainless steel by positron annihilation, (e) theoretical studies of the depth distribution of heavy-ion recoils. Possible improvements in the characteristics of CdTe detectors by introduction of hydrogen are being investigated. Operations of the MP Tandem accelerator and the main site computing facility are summarized. (Atomindex citation 11:553202)

AECL-6680 PC **A07**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Progress Report, Physics Division, 1 July to 30 September, 1979.
Nov 79, 146p PR-P-123
U.S. Sales Only.

Study of exotic new isotopes with the on-line isotope separator, ISOL, has begun. Quadrupole moments of isomeric states in lead isotopes have been further investigated. Progress is being made in identifying and overcoming certain insidious background processes in exp 14 C dating with the MP Tandem. The Fast Intense Neutron Source accelerator now operates well at 80% of design current. Development and construction of the Superconducting Cyclotron continues. Operation with larger plasma apertures has given improved beam quality and more beam current than expected from the duoPIGatron ion source. Commissioning of the Alvarez accelerator continues. The practicability of characterizing thick target spallation reactions in terms of ten activities from spallation and fast neutron fission multiplication has been demonstrated. Study of the temperature dependence of the condensate fraction in exp 4 He has been completed. A simple and very successful semiempirical relationship between the reduced superfluid density of liquid exp 4 He and the condensate fraction has been obtained. The source of copper impurities that are suspected to be limiting performance of CdTe detectors have been traced to the furnace wall materials; installation of platinum wall liners is planned. Refinement of programs for the simulation of chemical reactions continued. A number of improvements were made to the fuel defect experiment data processing system. Operations of the MP Tandem Accelerator and the main site computing centre are summarized. (Atomindex citation 11:553203)

ANL-8040(Sup.1-5) PC **A09**/MF **A01**
Argonne National Lab., IL.
Computer Software Summaries. Numbers 1 Through 423.
Sep 79, 182p
Contract W-31-109-ENG-38

The National Energy Software Center (NESC) serves as the software exchange and information center for the US Department of Energy and the Nuclear Regulatory Commission. A major activity of the Center is the preparation and publication of

two reports issued periodically - the Center's compilation of program abstracts, ANL-7411, and this software summaries report, ANL-8040. The abstracts describe the software packages available in the software exchange library maintained and distributed by the Center. The summaries describe agency-sponsored software that is at the specification stage, under development, being checked out, in use, or available at agency offices, laboratories, and contractor installations. Summaries describe software that is not included in the NESC library due to its preliminary status or because it is believed to be of limited interest. The purpose of the summaries report is to keep agency and contractor personnel informed as to the existence, status, and availability of computer programs within the agency, and thereby minimize duplication costs and maximize the value of agency software development efforts. (ERA citation 06:008506)

INFCE/DEP/WG-1/1 PC **A02**/MF **A01**
INFCE Working Group 1. Secretariat.
List of Working Group Documents Deposited with the IAEA.
1p
U.S. Sales Only.

No abstract available.

INIS-mf-5764 PC **A06**/MF **A01**
Rationalisierungs-Kuratorium der Deutschen Wirtschaft e.V., Frankfurt am Main (Germany, F.R.).
Quality Assurance. A Bibliographic Compendium.
G. H. Hiller. 1979, 108p
In German.
U.S. Sales Only.

This compendium intends to give fast bibliographic information and to fill the visible gap between documentation and general bibliographic information. The reader is given an outline of quality assurance and some examples of techniques from the relevant literature. The practical engineer, who is always short of time, is thus offered a quick survey and a fast deepening of his understanding by means of literature dealing specifically with his unresolved problems. The mansucript has been kept in tis original form in order to speed up its publication. The RKW technical department limited itself to checking its contents and the adherence to the established information goals. (Atomindex citation 11:531934)

KFTI-78-57 PC **A05**/MF **A01**
Akademiya Nauk URSR, Kharkov. Fiziko-Tekhnicheskii Inst.
General and Nuclear Physics.
1978, 85p
U.S. Sales Only.

A separate abstract was prepared for each section of the report. (Atomindex citation 11:549207)

LA-8587-MS PC **E09**/MF **$5.70**
Los Alamos Scientific Lab., NM.
Publications of LASL Research, 1979.
J. K. Willis, and C. A. Salazar. Nov 80, 250p
Contract W-7405-ENG-36
Includes 15 sheets of 24 reduction microfiche.

This bibliography is a compilation of unclassified publications of work done at the Los Alamos Scientific Laboratory for 1979. Papers published in 1979 are included regardless of when they were actually written. Declassification of previously classified reports is considered to constitute publication. All classified issuances are omitted. If a paper was published more than once, all places of publication are included. The bibliography includes Los Alamos Scientific Laboratory reports, papers released as non-LASL reports, journal articles, books, chapters of books, conference papers (whether published separately or as part of conference proceedings issued as books or reports), papers published in congressional hearings, theses, and US patents. The entries are arranged in sections by broad subject categories. (ERA citation 06:008505)

N81-16946/8 PC **A07**/MF **A01**
SOCIALDATA, Inst. fuer Empirische Sozialforschung G.m.b.H., Munich (Germany, F.R.).
Individual Information Strategies in the Field of Scientific and Technical Information, with Special Regard to the Use of Automatic Data Processing.
Final Report.
J. Becker, B. Mettler-meibom, J. Matheisen, and I. Sommer-becker. Aug 80, 145p BMFT-FB-ID-80-008
In German; English Summary. Sponsored by Bundesministerium fuer Forschung und Technologie.

Research which has been undertaken so far about individual information strategies in scientific and technical communication, particularly with regard to automatic data processing was analyzed. Areas of insufficient research are identified ideas how to orient research in the respective areas are presented. Hypothetical conclusions about the determinating dimensions of individual information behavior are considered. The need for further research is indicated to determine: (1) individual information strategies (empirical study); (2) organizational and institutional framework of individual information strategies; (3) structural comparison of the US and Germany system scientific and technical communication; and (4) the interrelation between personal communication and communication by media.

N81-16947/6 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
A Review and Evaluation of the Langley Research Center's Scientific and Technical Information Program. Results of Phase 1: Knowledge and Attitudes Survey, Larc Research Personnel.
Final Report.
T. E. Pinelli, M. Glassman, and E. M. Cross. Nov 80, 74p NASA-TM-81893

The effectiveness of the Langley STI program was assessed using feedback obtained from Langley engineers and scientists. A survey research procedure was conducted in two stages. Personal interviews with 64 randomly selected Langley engineers and scientists were used to obtain information for questionnaire development. Data were then collected by means of the questionnaire which covered various aspects of the Langley STI program, utilized both open and closed ended questions and was pretested for finalization. The questions were organized around the six objectives for Phase 1. The completed questionnaires were analyzed. From the analysis of the data, recommendations were made for improving the Langley STI program.

ORNL/TM-7126/R1 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Rigorous, Systematic Approach to Automatic Data Editing and Its Statistical Basis.
G. E. Liepins. Jan 81, 32p
Contract W-7405-ENG-26

Automation data editing is the computerized identification and correction (optional) of data errors. These techniques can provide error statistics that indicate the frequency of various types of data errors, diagnostic information that aids in identifying inadequacies in the data collection system, and a clean data base appropriate for use in further decision making, in modeling, and for inferential purposes. However, before these numerous benefits can be fully realized, certain research problems need to be resolved, and the linkage between statistical error analysis and extreme-value programing needs to be carefully determined. The linkage is provided here for the special case that certain independence and symmetry conditions obtain; also provided are rigorous proofs of results central to the functioning of the Boolean approach to automatic data editing of coded (categorical) data. In particular, sufficient collections of edits are defined, and it is shown that for a fixed objective function the solution to the fields to impute problem is obtainable simply from knowing which edits of the sufficient collection are failed, and this solution is invariant of the particular sufficient collection of edits identified. Similarly, disjoint-sufficient collections of edits are defined, and it is shown that, if the objective function of the fields to impute problem is determined by what Freund and Hartley call the number of involvements in unsatisfied consistency checks, then the objective function will be independent of the disjoint-sufficient collection of edits used. (ERA citation 06:008517)

PB81-139859 PC **A05**/MF **A01**
Science Press, Beijing (China).
Kexue Tongbao. Volume 25, Number 12, December 1980.
Dec 80, 100p
See also Volume 25, Number 1-2, PB81-131153.

Contents: On the distortion theorem of Schlicht functions; Trace theorems of the spaces (W sup l)(L sub p)(phi, Omega) and calculus of variations with strong nonlinearity; Recommendation and reference table of rigid elliptical waveguide data; Backward-wave parametric oscillation by degenerate four-wave mixing; A check on individual terms of nuclear mass formula; Nature of resonance in chemistry and principle of bond type variation; Comments on the 'ABT-concept'; A split method to solve equations of weather prediction; Characteristics of northeast China cold summer and global air temperature; Theoretical calculation of force constants and normal frequencies for CO2 molecules; A possible scheme for improving vertical resolution and accuracy of satellite temperature retrieval; Discovery of the lower tertiary reef limestone in the northern part of east China and its significance in petroleum geology; An investigation of the stress field in the earth's crust; Laser interferometric measurements of very small vibration amplitudes of the order of angstroms and its applications; Correlation analysis of organic matter content and spectral reflection properties of the soil in southern Xinjiang; Sex pheromone of corn borer ostrinia furnaculis; Pharmacological studies in new analogs of tremorine.

PB81-148611 PC **A07**/MF **A01**
Washington State Dept. of Natural Resources, Olympia.
Development of a Statewide Geographic Information System in Washington.
Final rept. 1 Jan 79-30 Mar 80,
Tim W. D. Gregg, Larry J. Sugarbaker, Eric W. Barthmaier, Robert B. Scott, and Roger A. Harding. Mar 80, 143p
Contract PNRC-10990018

The State of Washington Department of Natural Resources (DNR) has developed a cooperative statewide geographic information system which combines a statewide mapping, geographic information storage and remote sensing data collection/processing activities. The development of this system is in response to state legislation and the need for more compatible data at county, state and federal levels.

PB81-152373 PC **A08**/MF **A01**
National Inst. on Alcohol Abuse and Alcoholism, Rockville, MD.
State Alcoholism Profile Information System (SAPIS): National Status Report.
May 80, 154p NIAAA/NCALI-81-01

The State Alcoholism Profile Information System (SAPIS), developed by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) in close coordination with the State Alcoholism Authorities, was designed to provide information on the impact of the NIAAA formula grants on state alcoholism programs. This National Status Report (NSR) provides the following information: (1) alcoholism funding by sector, by sources, and by program area; (2) NIAAA alcoholism information; (3) distribution of funds by funding sources; (4) disbursement method for formula grant funds; (5) funds received by treatment organizations; (6) new initiatives funded; (7) admissions to state or federally assisted alcoholism facilities; (8) alcoholism treatment, prevention, and intervention establishments (including women and youth programs); (9) citizens' self-help and information groups; (10) credentialing, certifying, and accrediting; (11) state policies and regulations; (12) indicators of alcohol use or abuse; and (13) supplemental information.

PB81-154379 PC **A11**/MF **A01**
Creative Socio-Medics Corp., Vienna, VA.

Study of Data Reliability and Quality Control from National Alcoholism Program Information System: Detailed Methodology and Findings. Volume II.
Jun 79, 244p NIAAA/NCALI-81-05
Contract PHS-ADM-281-77-0028
See also Volume 1, PB80-132939.

Volume II of a two-volume report on NAPIS (the National Alcoholism Program Information System) is presented. NAPIS is an automated system for monitoring client performance, services provided to clients, and resources expended in approximately 450 alcohol treatment centers. Also monitored are public inebriate, Indian, occupational, and other related programs directly funded by the National Institute on Alcohol Abuse and Alcoholism. Findings are reported from a study designed to determine how much confidence users have in NAPIS data and to provide recommendations for making NAPIS more reliable. A detailed report is provided of all work that contributed to the conclusions and recommendations contained in Volume I. Major topics covered in this volume include: (1) an overview of NAPIS; (2) an in depth description of the study methodology; (3) a full report of results from a field exercise and a reliability and quality control analysis; and (4) an assessment of the feasibility of future validity studies.

PB81-156499 PC **A23**/MF **A01**
Department of the Interior, Washington, DC. Natural Resources Library.
Doctoral Dissertations, 1904-1979.
1980, 534p

The index lists 22,660 selected North American doctoral dissertations in the Natural Resources Library. All were written from 1904 through 1979 and cover a wide variety of subjects related to natural resources.

PB81-161804 PC **A04**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
The Use of Hospital In-Patient Data in the Analysis of the Injuries Sustained by Road Accident Casualties,
J. P. Nicholl. c1980, 59p TRRL-SUPPLEMENTARY-628
Also pub. as ISSN-0305-1315. Prepared in cooperation with University Coll., London (England). Transport Studies Group.

This study aimed at compiling from existing hospital casualty records and police accident records a dataset containing information on the nature of injuries to road accident casualties and on the circumstances of the accident in which each casualty was injured. Hospital In-Patient Enquiry data and national police accident data, which comprise the source data, are described and their accuracy discussed. These records are anonymous. Consequently, matching casualty records in the two datasets was a matter of selecting the most likely match. The method of selecting matches is explained, and some of the difficulties involved discussed. It is estimated that about 50 percent of the hospital records can be readily matched and that less than 10 percent of the matches are incorrect.

PB81-167959 PC **A19**/MF **A01**
Applied Management Systems, Inc., Bethesda, MD.
Veterans Administration Health Care Information System. Volume I. Acquisition Strategy and Plan.
Final rept.
1 Feb 80, 439p VA/CMSO-81/0007
Contract V-101(134)P-756
See also Volume 2, PB81-167967.
Also available in set of 6 reports PC E99, PB81-167942.

The objective of this document is to define a strategy and plan for the Veterans Administration Program Manager to manage the Health Care Information System (HCIS) major system acquisition. The HCIS system acquisition process is a sequence of specified phases of program activity and decision events directed to the achievement of established program objectives. The strategy seeks to satisfy the complete systems acquisition process and include a phased acquisition and implementation schedule. The plan provides for the consideration of alternative designs to meet the management and health care information system needs of the Veterans Administration.

PB81-167967 PC **A08**/MF **A01**
Applied Management Systems, Inc., Bethesda, MD.
Veterans Administration Health Care Information System. Volume II. Acquisition Process Schedule Critical Path Network.
Final rept.
1 Mar 80, 157p VA/CMSO-81/0008
Contract V-101(134)P-756
See also Volume 1, PB81-167959, and Volume 3, PB81-167975.
Also available in set of 6 reports PC E99, PB81-167942.

The document defines a master schedule for the Health Care Information System and each potential base subsystem (Patient Registration/Locator; Admission/Transfer/Discharge; Centralized Scheduling; Pharmacy; and Clinical Laboratories) using the Critical Path Method. The VA Program Manager, who represents the HCIS user community, will use this master schedule to review the status of the HCIS acquisition project. The Critical Path Method is a cyclical method of project control, which means that it can build and revise schedules continuously. As a project progresses, it will provide status reports showing an updated record of completed tasks, delays, and extensions. These reports will enable the Program Manager to monitor the impact of changes on the HCIS project and to maintain continuous control by responding quickly to problem areas. For clear concise management presentations, CPM can display the project schedule in either arrow diagram or Gantt chart format.

PB81-167975 PC **A09**/MF **A01**
Applied Management Systems, Inc., Bethesda, MD.
Veterans Administration Health Care Information System. Volume III. Framework and Methodology for Solicitation of Alternate System Design Concepts.
Final rept.
1 Jun 80, 181p VA/CMSO-81/0009
Contract V-101(134)P-756
See also Volume 2, PB81-167967, and Volume 4, PB81-167983.
Also available in set of 6 reports PC E99, PB81-167942.

The guide is designed to collect, collate, and organize selected information that relates to three areas of HCIS acquisition management: (1) the system acquisition and appropriation processes, (2) the responsibilities of the acquisition manager and his functional organization counterparts, and (3) the identification and examination of current issues that require acquisition management attention.

PB81-167983 PC **A07**/MF **A01**
Applied Management Systems, Inc., Bethesda, MD.
Veterans Administration Health Care Information System. Volume IV. Proposal Evaluation Guidelines.
Final rept.
1 Jun 80, 136p VA/CMSO-81/0010
Contract V-101(134)P-756
See also Volume 3, PB81-167975, and Volume 5, PB81-167991.
Also available in set of 6 reports PC E99, PB81-167942.

These proposal evaluation guidelines for the solicitation of alternative system design concepts for the Health Care Information System (HCIS) have been developed in accordance with the Health Care Information System Project Plan and Schedule. They consist of checklists that can be used by the Veterans Administration Program Manager to evaluate HCIS contractor proposals and determine HCIS project status.

PB81-167991 PC **A08**/MF **A01**
Applied Management Systems, Inc., Bethesda, MD.
Veterans Administration Health Care Information System. Volume V. Preliminary Demonstration, Test and Evaluation Criteria to Assess Contractor Life Cycle Costing (LCC) Performance.
Final rept.
30 Jun 80, 156p VA/CMSO-81/0011
Contract V-101(134)P-756
See also Volume 4, PB81-167983, and Volume 6, PB81-168007.
Also available in set of 6 reports PC E99, PB81-167942.

The report describes criteria that will permit the Veterans Administration to estimate Health Care Information System life cycle costs during systems design concept evaluation and selection, full scale development, facility conversion, and production, to ensure appropriate trade-offs among investment costs, schedules, and performance.

PB81-168007 PC **A10**/MF **A01**
Applied Management Systems, Inc., Bethesda, MD.
Veterans Administration Health Care Information System. Volume VI. Management Reporting Structure.
Final rept.
30 Jun 80, 213p VA/CMSO-81/0012
Contract V-101(134)P-756
See also Volume 5, PB81-167991.
Also available in set of 6 reports PC E99, PB81-167942.

The HCIS Program Manager must have a reporting system to predict, review, assess, negotiate, and monitor costs for system development, engineering, design, demonstration, test, production, operation and support (i.e., life cycle costs). Four methods will be used to establish and maintain control of this product: a critical path activity network and its related reports, weekly progress reports from contractor personnel, oral briefings by contractor personnel, and task completion reports prepared by both VA and contractor personnel. This reporting structure will monitor task completion by the contractors and provide the basis for monthly HCIS project status evaluations.

PB81-171704 PC **A15**/MF **A01**
Health Data Management Systems, Inc., Falls Church, VA.
Health Care Information Systems in the Private Sector. Volume I: Selection and Description of Applicable Functional Units in the VA Health Care Delivery Program, Final Deliverable 2.4.1.
30 Jun 80, 338p VA/CMSO-81/0002
Contract V-101(134C)P-747

The objective of this Consultant Study was to analyze the functional operations in VA Medical Centers and survey medical systems operational in the Private Sector. The contractor visited 18 VA Medical Centers and received information on 102 medical systems operational in the private sector from 77 different vendors. The study concluded by recommending private sector systems and subsystems for more intensive evaluation. The results of the study are presented in a Executive Summary and a five Volume report. This document presents the results of Volume 1 - Selection and Description of Applicable Functional Units in the VA Health Care Delivery Program.

PB81-171712 PC **A14**/MF **A01**
Health Data Management Systems, Inc., Falls Church, VA.
Health Care Information Systems in the Private Sector. Volume II: Health Care Facility Classes, Final Deliverable 2.5.1.
30 Jun 80, 316p VA/CMSO-81/0003
Contract V-101(134C)P-747

The objective of this Consultant Study was to analyze the functional operations in VA Medical Centers and survey medical systems operational in the Private Sector. The contractor visited 18 VA Medical Centers and received information on 102 medical systems operational in the private sector from 77 different vendors. The study concluded by recommending private sector systems and subsystems for more intensive evaluation. The results of the study are presented in a Executive Summary and a five volume report. This document presents the results of Volume II - Health Care Facility Classes.

PB81-171761 PC **A99**/MF **A01**
CRC Systems, Inc., Fairfax, VA.
Health Care Information Systems. VA Medical Center as Information System Module. Depiction of VAMC Information Exchange Network. (Task 5).
Final rept.
Jun 80, 610p VA/CMSO-81/0016
Contract V-101(134)P-757
Portions of this document are not fully legible.

The objective of this Consultant Study was to analyze and document the actual flow of information within VA Medical Centers. The study was conducted over a nine month period. Initially, three medium sized VAMC's (350-450 bed) were examined. For each center, data were obtained regarding structure; functional roles; information inputs, needs, and outputs; information systems; and networks of exchanges between providers and recipients of data involved in providing direct support to health care delivery. The second step involved synthesis and analysis of data collected which led to a hypothetical model of typical information flow within a VAMC. The final step involved the validation of the model at two smaller and one larger VAMC. The results of this study are presented in 5 volumes. This document sets forth the results of Task 5, VAMC Information Exchange Network.

5C. Economics

AD-A094 798/6 PC **A03**/MF **A01**
Center for Naval Analyses, Alexandria, VA. Inst. of Naval Studies.
Effects of Trade Restrictions on Imports of Steel.
Professional paper,
James M. Jondrow. Nov 80, 31p Rept no. CNA-PP-165

The papers in this session are two examples of a series of industry studies by the Bureau of International Labor Affairs. In addition to these two, studies have been completed on oil, footwear, and sugar, and are underway on chemicals and electronics. Each of these studies takes a close look at the special features of a particular industry in constrast to some of the more broad ranging projects reported in other sessions. In conclusion, I would like to emphasize the fact that the objective of these studies is to improve the evaluation of trade policy. When changes in trade barriers are considered, it is critically important to know how domestic demand responds to import costs, how employment will be affected, and what will be the impact of the labor market experience of workers in the industry. The two industry studies presented here are an attempt to expand the amount of available information on these questions.

AD-A094 942/0 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Economic Development and the 'Old' International Order,
Charles Wolf, Jr. Mar 80, 21p Rept no. RAND/P-6457

The principal reason why there are not more instances of sustained economic development among the LDCs is that they, or more exactly, economic development among the LDCs is that they, or more exactly, their leadership and their policy-making processes have other goals and objectives which compete for resources and attention with the goals of development. The competing objectives include greater national recognition in the international community (e.g., hyperactivity in international organizations and in diplomatic representation abroad), exercising ideological preferences (for socialism or etatisme), resolving (and sometimes activating) territorial or other disputes with traditional adversaries, and emphasizing (but usually without accomplishing) international redistribution rather than domestic economic growth. Although the prospects are, in general, not bright, there are some possibilities. If an investor, or a banker, or a policymaker were to ask me where the best prospects lie, I would give a two-part reply. First, examine on a country-by-country basis which LDCs seem to be adopting the political and economic recipes discussed earlier. For this purpose, changes are as significant as levels of effort. Second, my casual impression is, if this country-by-country review were made, the most promising candidates would include the following: Egypt, Indonesia, Malaysia, and perhaps Turkey. If all of them reach or surpass in the 1980s the experience of the NICs in the 1970s, they and the international community will be fortunate.

AD-A094 948/7 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Business and Bureaucracy: A Limited Critique of Charles Lindblom's Politics and Markets,
Thomas L. McNaugher. Mar 80, 15p Rept no. RAND/P-6467

In a book that deals with grand issues concerning the relationship of business and the political system, Charles Lindblom finally turns in the concluding chapter of his 'Politics and Markets' to some specific recommendations. To alleviate business privilege and the ubiquitous 'business veto,' both of which impede, in Lindblom's view, the nation's ability to deal with its problems, Dr. Lindblom suggests that we take a lesson from the nation's defense sector. Defense industries, he asserts, seem willing enough to accept a high degree of government control in return for assured profits. The lesson is clear: the government can limit corporate autonomy by guaranteeing profits, even in the case of 'enterprises producing for ordinary markets rather than for government contracts'. Financial indulgence, to use Dr. Lindblom's expression, can be used to 'offset regulatory severity.'

AD-A094 950/3 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
The Equity Effects of Restraints on Taxing and Spending,
Mark David Menchik, and Anthony H. Pascal. May 80, 32p Rept no. RAND/P-6469

This paper derives from Rand research that was stimulated by California's passage of Proposition 13. We learned two lessons early in our research. First, Prop. 13 was a manifestation of a process that extends far beyond a single law in a single state. We call this process 'fiscal containment'--a moderation of rapid growth in government that means a less prominent role for government in the economy and society. Most Americans seem to favor containment of government and, more and more, are electing officials who promise to act accordingly. The second lesson is that fiscal containment may have equity effects--consequences that especially benefit some population groups and especially hurt others. At each level of government (federal, state, and local) the rate of growth in spending has fallen to about half what it was previously, with a sharp change during the 1970s. Containment has several well-known positive consequences, of course: It puts money in the taxpayers' pockets; it seems to stimulate local economies; it may promote the efficiency and responsiveness of government. This paper, however, will concentrate on some of the possible adverse effects, many of them unexpected even by opponents of the fiscal containment movement.

AD-A095 023/8 PC **A03**/MF **A01**
Texas Univ. at Austin. Center for Cybernetic Studies.
An Infinite Constrained Game Duality Characterizing Economic Equilibrium.
Research rept.,
A. Charnes, K. O. Kortanek, and S. Thore. Nov 80, 39p Rept no. CCS-386
Contract N00014-75-C-0569, Grant NSF-ENG78-25488

The principal economic assumptions of this paper are neoclassical behavior assumptions on a consumer group which owns the resources and a collection of producers employing these resources. A saddle value problem is formulated to characterize equilibrium in the economy in the sense that at equilibrium prices producers determine production plans to maximize profits and that these outputs and inputs are exactly those demanded and supplied respectively by the consumer group. The saddle value problem is shown to be equivalent to a dual pair of uniextremizations termed the consumer group's problem and the producer's problem. The neoclassical economic assumptions yield sufficient conditions which are among the most general ones for guaranteeing a saddle point and simultaneously a perfect duality for the dual programming pair. Economic interpretations are given for all the variables of the consumer group's problem and for all the variables of the producers' problem even at non-optimal stages in each problem. The approach is an infinite dimensional extension of the Charnes' constrained game linear programming equivalents in finite dimensions. (Author)

HRP-0250401/7 PC **A05**/MF **A01**
North Carolina Univ. at Chapel Hill. Dept. of Sociology.
The Control of Cost in the Federal Republic of Germany: Lessons for America,
Henry A. Landsberger. Feb 81, 90p DHHS/PUB/HRA-81-14003

Concern for the control of health care costs is universal. As a primary goal of the health planning program, it is necessary to consider a variety of cost control theories, techniques and structures. This study presents extensive research into the scope of cost control efforts in the Federal Republic of Germany, considering the interaction of financial and legislative forces with the roles of physicians, labor unions and social traditions. Many aspects of these experiences can be translated into the American health planning efforts.

INIS-mf-5733 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Ottawa (Ontario).
Reorganization of AECL and the Future Marketing Program.
J. Donnelly. 9p
U.S. Sales Only.

Atomic Energy of Canada Ltd. Engineering Co. has been reorganized to support the new emphasis on foreign sales of CANDU reactors. Much has been learned from reactor sales to Argentina, Korea, and Romania, but Canada needs to sell one 600 MWe reactor a year in order to avoid a decline in its nuclear industry. (Atomindex citation 11:532328)

N81-16513/6 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Regional Price Targets Appropriate for Advanced Coal Extraction.
K. L. Terasawa, and D. M. Whipple. 1 Dec 80, 74p NASA-CR-163896, JPL-PUB-80-91
Contracts NAS7-100, DE-AI01-76ET-12548

A methodology is presented for predicting coal prices in regional markets for the target time frames 1985 and 2000 that could subsequently be used to guide the development of an advanced coal extraction system. The model constructed is a supply and demand model that focuses on underground mining since the advanced technology is expected to be developed for these reserves by the target years. Coal reserve data and the cost of operating a mine are used to obtain the minimum acceptable selling price that would induce the producer to bring the mine into production. Based on this information, market supply curves can be generated. Demand by region is calculated based on an EEA methodology that emphasizes demand by electric utilities and demand by industry. The demand and supply curves are then used to obtain the price targets. The results show a growth in the size of the markets for compliance and low sulphur coal regions. A significant rise in the real price of coal is not expected even by the year 2000. The model predicts heavy reliance on mines with thick seams, larger block size and deep overburden.

N81-16951/8 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Assessment of Potential Future Hydrogen Markets in the U.S..
A. K. Kashani. Sep 80, 65p JPL-PUB-80-68
Contracts NAS7-100, ET-78-I-01-3112

Potential future hydrogen markets in the United States are assessed. Future hydrogen markets for various use sectors are projected, the probable range of hydrogen production costs from various alternatives is estimated, stimuli and barriers to the development of hydrogen markets are discussed, an overview of the status of technologies for the production and utilization of hydrogen is present-

ed, and, finally, societal aspects of hydrogen production and utilization are discussed.

PB81-144917 (Order as PB81-144909, PC **A06**/MF **A01**)
Tokyo Univ. of Fisheries (Japan).
Japan's Squid Fishing Industry,
William G. Court. Aug 80, 10p NOAA-80112805-1
Included in Marine Fisheries Review, v42 n7-8 p1-9, Jul-Aug 80.

Japan's squid fishing industry is merely outlined, but plans to develop U.S. squid fisheries would benefit from detailed study of certain of its aspects. Several items might include: (1) analysis of the advantages, disadvantages, and relative costs of each fishing method; (2) investigation of specific markets and marketing strategies for particular species of U.S. squid; and (3) evaluation of possible U.S.-Japan cooperative arrangements to develop the U.S. industry.

PB81-146789 MF **A01**
Fund for Multinational Management Education, New York.
Science and Technology for Development: Corporate and Government Policies and Practices,
Jack N. Behrman, and William A. Fischer. c1980, 158p ISBN-0-89946-023-2, NSF/PRA-7721851/1
Grant NSF-PRA77-21851
Library of Congress catalog card no. 79-27213. Prepared in cooperation with North Carolina Univ. at Chapel Hill.

A series of case studies concerning research and development (R & D) activities of five transnational corporations (TNCs) was initiated in 1977. The studies focused on a single product line from each company. Activities were surveyed in the United States and abroad. Instead of updating these studies, it was decided to test whether the results could be generalized. In a new phase involving 58 international companies operating in the United States, Europe, and Japan, the limits of inquiry were broadened. A better understanding of the relationship of science and technology (S & T) policies of developing countries to the R & D of international companies was sought. Nine less developed countries (LDCs) were included to determine ways other countries might help them to develop indigenous capabilities. This monograph summarizes three of the original studies and presents findings of more recent investigations in the following areas: pharmaceutical programs in tropical diseases; S & T policies of developing countries; and United States response to S & T needs in industrial development of LDCs.

PB81-150484 PC **A05**/MF **A01**
Accion International, Cambridge, MA.
Microbusiness and Employment in Central Maine: A Summary,
John C. Hammock, and Gerard R. Dodd. c1979, 77p

In spite of unprecedented growth in national development, the more isolated urban and rural areas of the United States continue to face stubborn problems of unemployment and underemployment, increased dependence on government subsidies and the flight of skilled laborers, entrepreneurs and youth to the large cities. This study explores microbusiness marketing, employment, salaries and benefits, credit use, credit needs, technical assistance, and opinions of micro-business owners.

PB81-150682 PC **A06**/MF **A01**
Accion International, Cambridge, MA.
Assisting the Smallest Scale Economic Activities of the Urban Poor. PISCES: Program for Investment in the Small Capital Enterprise Sector Phase I,
Jeffrey Ashe. 1980, 114p

The need for assistance to the smallest of entrepreneurs, many of whom could apply these resources profitably, is clear. However, without an understanding on the part of donors of this group's special circumstances, constraints, and potential, the smallest of entrepreneurs will almost certainly never receive the wherewithal to help themselves. This report examines the characteristics of microenterprises, paying close attention to their role and importance in the urban economy. It then classifies methods of assisting these enterprises and describes the projects observed. Finally, the report summarizes the lessons learned about direct assistance methods and discusses their implications for donors and practitioners.

PB81-156572 PC **A05**/MF **A01**
Rogers National Research, Inc., Toledo, OH.
Changes in Motor Vehicle Buyer Attitudes and Market Behavior.
Final rept. Aug 79-May 80,
Paul E. Green, and Peter W. Rogers. Dec 80, 82p DOT-TSC-NHTSA-80-29, DOT-HS-805 593
Contract DOT-TSC-1720

An analysis is made of the impact of fuel efficient motor vehicle design changes on the attitudes and market behavior of buyers of new motor vehicles over time. Car buyer profiles are prepared describing by make, demographic characteristics, owner satisfaction, reasons for buying, car characteristics, source of sales, and owner loyalty. The truck profiles include demographic characteristics, characteristics of new vehicle purchased, other trucks and vans owned, alternate purchase decision, and vehicle useage. The analysis focuses on determining the statistically significant changes that occurred among buyers of specific makes when new fuel efficient designs are introduced and tracking their changes through time.

PB81-158206 PC **A11**/MF **A01**
New Mexico Univ., Albuquerque. Dept. of Economics.
The Economic Effects of State and Federal Tax Structures on the Exploitation of Mineral Resources.
Final rept.,
Joel P. Clark, Patricia T. Foley, and Martin B. Zimmerman. 1980, 236p NSF/RA-800342
Grant NSF-AER77-18684

Detailed engineering and economic simulation models of the domestic coal and copper industries are specified, estimated, and tested. The present effective tax rates and plausible tax regimes are simulated so that these models can be evaluated and their economic effects revealed. Sixteen coal-producing states and nine states with economically exploitable copper reserves are surveyed for all taxes which affect investment and operation decisions. Tax bases are categorized as output, profit, physical capital, and land. These Federal and state taxes as of 1977 are reported in detail. Conclusions point out that taxes imposed by states on coal and copper extraction are levied on inputs to the production process as well as on outputs; resource tax policy is the result of a variety of conflicting special interest groups confronting each other in the marketplace and political environment; and that existing state and Federal taxes (1977) create only small net welfare losses. Many graphs and tables accompany the text.

PB81-928201 PC **E03**/MF **A01**
Central Intelligence Agency, Washington, DC.
China: International Trade Second Quarter, 1980.
Research paper.
Feb 81, 49p ER/CIT-81-001
Paper copy also available on Standing Order, Deposit Account required. North American Continent price based on page count of individual documents; all others write for quote. This series offers a reduction in price as a Standing Order, PB81-928200.

China's trade in the second quarter was characterized by rapidly increasing exports, moderate import growth, and a $550 million trade surplus--the largest of four consecutive surpluses.

5D. History, Law, and Political Science

AD-A094 670/7 MF **A01**
National Defense Univ., Washington, DC. Research Directorate.
Essays on War: 1. The Inconsequence of Superpower War, 2. Quarantine, 3. The Quagmire of Self-Defense,
Walter R. Thomas. 1981, 81p
Availability: Superintendent of documents, GPO, Washington, DC 20402 HC$3.75 GPO stock no. 008-020-00648-6. Microfiche furnished to DITC (and NTIS) users.

Rarely does the career military officer have an opportunity to step back from the daily press of a line or staff assignment and reflect upon the lessons learned from his career. Captain Walter 'R' Thomas, USN, when afforded this opportunity in the form of a National Defense University Research Fellowship, responded enthusiastically. His three essays represent a senior career naval officer's observations on various aspects of international law and human conflict. In his first essay, 'The Inconsequence of Superpower War,' Captain Thomas assumes that the possibility of war between the United States and the Soviet Union is remote, at least as long as these two nations maintain their relative power. The greatest danger is viewed as a confrontation which could occur by error, miscalculation, or involvement in someone's else's 'splendid little war.' In the next essay, Captain Thomas proposes that 'Quarantine' operations could be adopted as an alternative to war when they are directed by regional agencies-as the Cuban Quarantine was when it was invoked under the auspices of the Organization of American States. Similar maritime operations by regional agencies are suggested as actions short of war which nations might impose to discipline aggressors and resolve disputes. 'The Quagmire of Self-Defense,' the third essay, discusses self-defense as a basic right of nations, but alleges that it often is a political gambit which nations use to justify their use of military force. While the doctrine of self-defense is defined generally in the United Nations Charter, the author notes that governments often deliberately apply the concept imprecisely. (Author)

AD-A094 716/6 PC **A03**/MF **A01**
Army War Coll. Strategic Studies Inst., Carlisle Barracks, PA.
Options for US National Strategy in the 1980's and Beyond.
Strategic issues research memo.,
William O. Staudenmaier. 9 Jan 81, 29p

This memorandum examines the interrelationships among the evolving strategic environment, US national interests and national strategy. The author considers the concept of national strategy by placing the current national strategy in historical perspective and examines the difference between strategy and policy. In order to develop strategic options, the four fundamental elements of US national interest -- survival, preservation of national territory, preservation of contemporary American values and maintenance or enhancement of the US standard of living as are analyzed in the context of the emerging global strategic situation. Next, four national strategic options are developed and one element, deterrence, common to them all, is discussed. The author concludes that the dynamic nature of the future world environment will require flexibility and perhaps a synthesis of the four basic options examined. (Author)

AD-A094 779/6 PC **A02**/MF **A01**
Army War Coll. Strategic Studies Inst., Carlisle Barracks, PA.
The Future of US-Japan Military Relations, 1990-2000,
William V. Kennedy. 26 Jan 81, 17p

This paper reviews the current security relations which exist bwtween the United States and Japan. It identifies some prominent trends and concludes that the complexities of the US-Japan political-economic-security relationships are so complex that a great deal of study is required if the United States desires to have a stronger and more beneficial relationship with Japan by the end of the century. (Author)

AD-A094 936/2 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Yugoslavia: The Non-Leninist Succession,
A. Ross Johnson. Jan 80, 13p Rept no. RAND/P-6442

The Yugoslav Communist system was once, to be sure, a Leninist system, and the Leninist model of political succession did apply. As late as the mid-1960s, there was a single heir-apparent, Aleksandar Rankovic, who owed his position (apart from his wartime association with Tito) to his control over the Party's organizational levers of power as Central Committee Secretary responsible for organizational and cadre questions and as former chief of the secret police. But since the late 1960s, the Yugoslav system, and the resulting prospects for political succession, have changed profoundly -- for reasons which will be reviewed. At the end of the 1960s, Tito himself recognized the imperative of a new approach to the succession issue. Expressing these concerns, Tito initiated and oversaw the construction of new, less personalized mechanisms intended to provide Yugoslavia with leadership 'after Tito.' The resulting process has now been underway for about a decade and has (particularly in the past year) achieved considerable success. This paper outlines the highlights of that process.

AD-A094 946/1 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
The Soviet Union and China,
Harry Gelman. Mar 80, 48p Rept no. RAND/P-6465

The discussion that follows seeks to explore Sino-Soviet interaction in this transitional period, to examine the motives and behavior of the two antagonists as they have reacted to evolving circumstances prior to the Afghan watershed, and on this basis to assess the possible effects of Afghanistan upon the future of the Sino-Soviet relationship.

AD-A094 947/9 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
The Use of Force in Soviet Policy and the West,
Alex Alexiev. Mar 80, 12p Rept no. RAND/P-6466

It is by now widely believed that the Soviet invasion of Afghanistan and the Carter administration's reaction to it mark a new watershed in the relationship between the two superpowers and augur a period of tensions and hostility, if not the beginning of a new Cold War. The main reason for this reassessment is the belief that the Soviet action represents a qualitatively new stage in Soviet policy -- one characterized by the unrestrained use of military power for the achievement of political objectives. Perhaps nothing is more characteristic of this attitude than the President's own statement that the Soviet intervention represents a 'radical departure' from previous Kremlin policy, which has caused a dramatic reversal of his views of Soviet policy and ultimate objectives. In fact, the Soviet Assault on Afghanistan, though particularly brutal, is neither unprecedented, nor is it particularly surprising, and Washington's present attitudes reveal a fundamental misperception of Soviet international behavior in general, and the role of military power in Moscow's foreign policy in particular.

AD-A094 979/2 PC **A02**/MF **A01**
Army War Coll. Strategic Studies Inst., Carlisle Barracks, PA.
Nationalism: A Lesson from German History,
Henry C. Gole. 15 Jan 81, 22p

The German Socialists (SPD), the backbone of the Second International, joined fellow socialists in the vow that never again would worker face worker over bayonets. As August of 1941 approached, however, the pull of nation proved to be stronger than class feelings, and German, Russian, British, French and Austrian workers marched off to join the colors with enthusiasm. Despite the intervening half century, nationalism remains today a very strong emotion. (Author)

AD-A095 011/3 PC **A07**/MF **A01**
Naval Postgraduate School, Monterey, CA.
China's Fourth Modernization: Procedure and Effects on U. S. Foreign Policy.
Master's thesis,
William J. Suggs, III. Jun 80, 135p

This paper deals with the modernization of China's National Defense sector. After the deaths of two of China's revolutionary leaders, China launched a program to improve the deficiencies of its armed forces. This thesis looks at this new emphasis, focusing on three different aspects. The first aspect deals with an examination of the international and domestic determinants surrounding the Chinese conclusion that it had to modernize its armed forces. This part stresses the inappropriateness of China's military doctrine in defending an adversary on a modern battlefield. The second aspect deals with the role of arms transfers, stressing the effect this procedure has had on the equipment, doctrine, personnel, and training of the military organization in China. The final aspect covered deals with the effect that modernization of China's armed forces will have on U.S. relations with China in the years ahead. (Author)

AD-A095 019/6 PC **A07**/MF **A01**
Naval Postgraduate School, Monterey, CA.
The U.S. Security Interest in Korea.
Master's thesis,
John Scott Williamson, Jr. Sep 80, 131p

The interests of the United States on the Korean peninsula have escalated considerably since 1945. A number of critical decisions by U.S. policy makers have further increased U.S. involvement and there can be no argument that the U.S. has been and will continue to be involved in the affairs of this Northeast Asian country. The dynamic diplomatic changes that have occurred in Asia in the past decade requires that the United States redefine their Asian interests. The U.S. has successfully deterred the North Korean military forces for the last thirty years but the time has come for a reassessment of the U.S. commitments and interests in Northeast Asia, and specifically on the Korean peninsula. (Author)

AD-A095 055/0 PC **A05**/MF **A01**
RAND Corp., Santa Monica, CA.
Saudi-Egyptian Relations: the Political and Military Dimensions of Saudi Financial Flows to Egypt,
Jake Wien. Jan 80, 96p Rept no. RAND/P-6327

This paper examines the vicissitudes of relations between Saudi Arabia and Egypt in the past decade and focuses on the aid flows and their political and military dimensions. In particular, and to their exclusion of private sector flows for which confidentiality is an important obstacle for research, cash flows from the Saudi public sector to the public sector of Egypt will be ascertained, but no methodical attempt will be made to determine their ultimate effects at the microeconomic level. A conceptual overview of the many institutional and non-institutional channels through which Saudi aid to Egypt flows follows. The chart divides Saudi economic aid to Egypt into descriptive categories of origins and ends. Emanating from both the public and private sector in the recipient economy, often passing through intermediary financial institutions, aid has flowed to either the public or private sector in the recipient economy. The essential Arab aid institutions, bilateral and multilateral, and their respective assistance to Egyptian development are examined.

AD-A095 086/5 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Iran's Ethnic Factions Threaten to Split the State,
S. Enders Wimbush. Apr 80, 9p Rept no. RAND/P-6477

While the eyes of the world have been fastened on the plight of American hostages in Tehran and on the fanatical city mobs that cheer each new proclamation by Ayatollah Ruhollah Khomeini, Iran has been slowly fraying at the edges. No facet of the conflict in Iran is likely to affect the post-crisis political environment more fundamentally than unrest and militancy among that state's important ethnic minorities. The changing political equation is a very simple one: The dominant Persian majority is rapidly losing its ability to control events along Iran's periphery, which is inhabited primarily by non-Persians. Ethnic minorities have seized the opportunities resulting from chaos at the center to advance a variety of local demands. In its present state of disarray, the Iranian army--or at least those soldiers and units loyal to Ayatollah Khomeini, for it should be remembered that Iran's army is a multiethnic one-will probably not be able to contain local rebellions for very long, and there is no suggestion that this situation will improve in the future. (Author)

AD-A095 089/9 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
On Weaning Iraq Away from Moscow,
Steven J. Rosen. May 80, 6p Rept no. RAND/P-6484

Suddenly, after years of neglect, the subject of Iraq is a matter of lively debate. We seem to have lost Iran for the foreseeable future, so the argument goes, and the Soviets may inherit that country through realignment, subversion, or direct invasion. Iraq, on the other hand, is evolving away from its close relationship with the U.S.S.R., and maybe through the right initiatives we can secure its cooperation with the West. If this could be done, they would have Iran and we would have Iraq as allies, and this might cancel many of the effects of the strategic reversal we have suffered since the fall of the Shah. Certainly the loss of Iraq would be a matter of considerable interest in Moscow, more so yet if it went over to the West. On the economic front, Iraq's oil reserves appear to exceed those of Kuwait and possibly Iran; its current oil exports are exceeded only the Saudi Arabia; and if it were to seize control of the adjacent oil fields of Iran and Kuwait it would soon be the number one exporter and the dominant voice in OPEC.

AD-A095 090/7 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Counterforce, Conventional Arms, and Confusion: A Comment on the Brussels Conference,
Malcolm W. Hoag. May 80, 26p Rept no. RAND/P-6485

The famous conference on 'NATO, The Next Thirty Years,' in Brussels on September 1-3, 1979, produced a great uproar because of Henry Kissinger's opening address. In consequence, the other papers at that conference were neglected. Now we can consider the Symposium as a whole, thanks to The Washington Quarterly. About one outstanding paper we need say little. Professor Samuel P. HUntington's 'American Foreign Policy: The Changing Political Universe' presents an admirably succinct summation of trends in America, buttressed by solid evidence and apt synthesis that brought reassurance to Europe. He proved that American puplic opinion is moving toward support of a stonger military posture, which pleased our shaken allies. Professor Michael Howard's 'Social Change and the Defense of the West' is, to this reader, a classic. His scope is global, and his depth extends to historical trends measured by the centuries. He understands war, in all its complexity and horror, and, as a corollary, the resultant aversion in the West even to consider it. Yet never has the sensible case for conventional defense in NATO been put better, in terms that reduce vast complexities to straightforward common sense. Given my opening allusion to mathematics, Professor Howard achieves the ultimate accolade of elegance.

AD-A095 120/2 PC **A07**/MF **A01**
RAND Corp., Santa Monica, CA.
German Strategic Deception in the 1930s.
Interim rept.,
Michael Mihalka. Jul 80, 128p Rept no. RAND/N-1557-NA
Contract MDA903-76-C-0119

No abstract available.

AD-A095 171/5 PC **A06**/MF **A01**
RAND Corp., Santa Monica, CA.
A Comparison of the Polish and Soviet Armaments Decisionmaking Systems.
Interim rept.,
Michael Checinski. Jan 81, 101p Rept no. RAND/R-2662-AF
Contract F49620-77-C-0023

The accessible Polish literature, the author's experiences in Poland, and interviews with former key Polish personnel open a 'window' on the Soviet military-industrial complex. Discussion of Polish and Soviet systems identify and describe lines from the highest decisionmaking body (the Polish Committee for National Defense, the Soviet De-

fense Council) through intermediate military-bureaucratic bodies (Military Industrial Commission, General Staff components, the military group of each Central Planning Commission, the military departments of the industrial ministries) to the military 'buyers' (voenpredy) in the factories, institutes and other enterprises. Soviet Defense Council military doctrine and strategy influence all economic planning and development in the USSR. The military elite and the military-oriented Party leaders tend to push for rapid modernization, while the military industrialists are reluctant to change. The direction of Soviet defense policy and size of Soviet military forces are decided solely by the Party First Secretary and the Politbureau together with the Defense Council. (Author)

N81-16954/2 PC **A09**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
The Rules Implementing Sections 201 and 210 of the Public Utility Regulatory Policies Act of 1978: A Regulatory History.
R. N. Danziger. 15 Sep 80, 184p NASA-CR-163900, DOE/JPL-1012-48
Contracts NAS7-100, EX-76-A-29-1012

The act provides that utilities must purchase power for qualifying producers of electricity at nondiscriminatory rates. It exempts private generators from virtually all state and federal utility regulation. Pertinent reference material is provided.

PB81-117905 PC **E03**/MF **A01**
Bureau of Land Management, Washington, DC.
Compilation of Laws Related to Mineral Resource Activities on the Outer Continental Shelf. Volume I.
Jan 81, 298p
See also Volume 2, PB81-117913.
Also available in set of 2 reports PC E05, PB81-117921.

This document, in two volumes, is a compilation of Federal laws which directly or indirectly relate to the OCS mineral program responsibilities of the Department of the Interior. Thirty-five laws, as amended, are included.

PB81-117913 PC **E03**/MF **A01**
Bureau of Land Management, Washington, DC.
Compilation of Laws Related to Mineral Resource Activities on the Outer Continental Shelf. Volume II.
Jan 81, 361p
See also Volume 1, PB81-117905.
Also available in set of 2 reports PC E05, PB81-117921.

This document, in two volumes, is a compilation of Federal laws which directly or indirectly relate to the OCS mineral program responsibilities of the Department of the Interior. Thirty-five laws, as amended, are included.

PB81-803942 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Historical Background Studies of the National Park Service. 1964-January, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Jan 81.
Feb 81, 279p
Supersedes PB80-804065, and NTIS/PS-79/0021.

Citations dealing with various places, structures, and events of historical interest are discussed. The reports are written in an interesting, narrative style and cover the historical background of national parks, canals, rivers, houses, famous personalities, forts, and battlefields. (This updated bibliography contains 272 citations, 18 of which are new entries to the previous edition.)

5E. Human Factors Engineering

AD-A094 661/6 PC **A10**/MF **A01**
Advisory Group for Aerospace Research and Development, Neuilly-sur-Seine (France).
Advancement on Visualization Techniques,
Walter M. Hollister. Oct 80, 225p Rept no. AGARD-AG-255

Contents: The Presentation of Static Information on Air Traffic Control Displays; Flat Panel Display Technology Overview; The Electro-Optical Display/Visual System Interface: Human Factors Considerations; Integration of Sensors with Displays; Liquid Crystal Displays; Cathode Ray Tubes and Plasma Panels as Display Devices for Aircraft Displays; Large Area Gas Discharge Displays; Optical Infinity Lens Developments for Flight Simulator Visual Displays; Evolution of Tactical and Map Displays for High Performance Aircraft; Helmet Mounted Displays: Design Considerations; An Advanced Electronic Cockpit Instrumentation System: The Coordinated Cockpit Display; The Influence of Visual Requirements on the Design of Military Cockpits; Display Concepts for Control Configured Vehicles; Experiments Using Electronic Display Information in the NASA Terminal Configured Vehicle.

N81-16022/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Moffett Field, CA. Ames Research Center.
Human Factors of Flight-Deck Automation: Nasa/Industry Workshop.
D. A. Boehm-davis, R. E. Curry, E. L. Wiener, and R. L. Harrison. Jan 81, 26p NASA-TM-81260, A-8432
Workshop Held at Burlingame, Calif., 17-18 Jul. 1980.

The scope of automation, the benefits of automation, and automation-induced problems were discussed at a workshop held to determine whether those functions previously performed manually on the flight deck of commercial aircraft should always be automated in view of various human factors. Issues which require research for resolution were identified. The research questions developed are presented.

5G. Linguistics

AD-A094 762/2 PC **A12**/MF **A01**
Illinois Univ. at Urbana-Champaign. Coordinated Science Lab.
Evaluation of Natural Language Processors.
Doctoral thesis,
Harry Ralph Tennant. Nov 80, 255p Rept no. T-103
Contract N00014-75-C-0612

This thesis attempts to clarify some of the difficulties behind evaluating the performance of natural language processors. It also proposes an evaluation method that is designed to be systematic and thorough. The method relies on considering a natural language processor from three viewpoints in the light of several taxonomies of issues relevant to natural language processing. Finally, an evaluation is described of PLANES, a natural language database query system.

5H. Man-Machine Relations

AD-A094 662/4 PC **A02**/MF **A01**
New Mexico State Univ., Las Cruces. Behavioral Engineering Lab.
Ground-Referenced Visual Orientation with Imaging Displays.
Final rept. Oct 79-Sep 80, on Phase 3,
Stanley N. Roscoe. Nov 80, 10p BEL-80-3/AFOSR-80-3, AFOSR-TR-81-0080
Grant AFOSR-80-0024
See also AD-A081 882.

Among the many findings reported, the following stand out as contributing to our understanding of the performances of pilots. Judgments of size, and by inference the distance, of objects in natural outdoor vistas are strongly dependent on the distance to which the eyes are focused (r approx 0.9); the exact functional relationship is confounded by the grossly progressive psychophysical inequality of units of the dioptric scale. Accommodation to natural vistas depends in a complicated way on the dark focus of the individual, the retinal locus and spatial frequency of visible texture, and the sharpness of focus needed for the desired discrimination of object identity, for example, reading a sign. Individual differences in dark focus range from perhaps 15 D in extremely myopic people to as distant as -4 D in the extremely hyperopic; the more distant the individual's dark focus, the greater the individual's tendency to focus beyond an acuity target to maximize apparent size for the discrimination of detail. Some individuals can be trained more readily than others to control the focal distance of their eyes voluntarily; there is some evidence that such trainability depends in part on the individual's dark focus and that both the selection and training of combat pilots should take such characteristics into account. (Author)

AD-A094 783/8 PC **A04**/MF **A01**
California Univ., Santa Barbara. Dept. of Psychology.
On the Estimation of Mental Workload.
Final rept.,
John W. Senders, and Robert M. Gottsdanker.
Nov 80, 60p AFOSR-TR-81-0087
Grant AFOSR-79-0133

The only practical way to attack the problems of mission delimitation, machine improvement, and operator specification in respect to mental workload appears to be computer simulations of both man and system performing a well-specified mission. As real systems afford the operator relative freedom of choice, the simulation of the human operator must possess intelligence. Unfortunately the data gathered in the laboratory on human performance are highly synthetic and concern the lowest elements of behaviour. Uncritical use of these data to solve problems of mental workload cannot be justified. The utilization of methods of artificial intelligence to bear upon the intelligent restructuring of tasks appears feasible at the present time. It will probably suffice to include rational decision making and a capacity to solve certain classes of games. (Author)

AD-A095 070/9 PC **A06**/MF **A01**
Honeywell Systems and Research Center, Minneapolis, MN.
Real-Time Feasibility for Generation of Nonlinear Textured Terrain.
Final rept.,
Duane Soland, Mark Voth, and Pat Narendra.
Jan 81, 115p AFHRL-TR-79-27
Contract F33615-77-C-0073

This study was conducted by Honeywell for the Air Force Human Resources Laboratory (AFHRL) in order to evaluate and study a potential new approach for the simulation of visual and sensor imagery for Air Force training applications. This report describes the hardware implementation of a curved-surface method for computer image generation (CIG) of textured terrain imagery. General comments and details of the algorithms are presented. This is followed by a discussion of the hardware required for a real-time implementation of this technique. The approach involves the display of terrain as curved surfaces represented by bicubic splines. Texture patterns may then be mapped to these terrain surfaces. Buildings or man-made features may be drawn using polygonal surfaces. This curved approach is of interest because it may represent a more cost-effective method to include more detail in the simulated imagery. Current systems are constrained to the use of straight edges in the representation of real-world features and require large numbers of edges to display complex, irregular objects such as terrain. Therefore, the curved surface approach may demonstrate many advantages over the straight edge technique. (Author)

AD-A095 106/1 PC **A03**/MF **A01**
Naval Training Equipment Center, Orlando, FL.
Front-End Analysis: Generic and Nongeneric Models.
Final rept. Jun 79-Aug 80,
B. E. Mulligan, and J. F. Funaro. Sep 80, 47p
Rept no. NAVTRAEQUIPC-IH-325

Front-end analysis is described as an iterative process by means of which the requirements of a

system may be made progressively more definitive. The importance of information to the process - whether it is obtained through an empirical study or from a generic data base - is stressed. The degree of detail with which system requirements may be specified depends on the level of information available at the time they are formulated. As specificity of system requirements increase, there may be a corresponding advance in the state of the system. The analysis process may be degraded by time-cost constraints, etc., the primary result being a reduction in the amount and quality of information needed by the analyst to determine system requirements and alternative action plans at adequate levels of specificity. It is agreed that this degrading effect of constraints may be minimized by an information procurement and management system that would make available to the analyst generic data. A number of models for front-end analysis that take advantage of generic data bases are presented within the context of training systems. Each is evaluated in terms of the gain in specificity of training requirements and instructional regimens that it may achieve relative to non-generic analyses carried out under constrained and constraint-free conditions. (Author)

5I. Personnel Selection, Training, and Evaluation

AD-A094 625/1 PC **A09**/MF **A01**
Canyon Research Group, Inc., Westlake Village, CA.
Simulator Training Requirements and Effectiveness Study (STRES): Future Research Plans.
Final rept. Aug 77-Jan 80,
Wallace W. Prophet, Jack B. Shelnutt, and William D. Spears. Jan 81, 178p AFHRL-TR-80-37
Contract F33615-77-C-0067

This report, prepared for Air Force personnel responsible for the development and execution of future programs of research on the design, development, and use of aircrew training devices (ATDs), presents topics to be considered in the development of future ATD research programs. The topics were developed in the course of the Simulator Training Requirements and Effectiveness Study (STRES). One objective of STRES was to identify gaps in the technology base that underlies the development and use of ATDs. Research needs were identified on the basis of reviews of the simulation research literature; observations and interviews conducted at a wide variety of simulator training agencies; interviews and discussions with simulator research, procurement, management, and design personnel; and comparisons of suggested topics with plans of various ATD research agencies. The report presents a basic listing of 111 potential research topics. Detailed research plans were developed for 21 of these topics of highest priority. Each plan includes: (a) problem statement; (b) research overview; (c) analytic requirements; (d) suggested experimental methodology; (e) subjects requirements; (f) data collection and analysis plans; (g) facilities requirements; and (h) projected schedule and manpower requirements. Less detailed plans are presented for nine additional topics. (Author)

AD-A094 665/7 PC **A10**/MF **A01**
Canyon Research Group, Inc., Westlake Village, CA.
Aircrew Training Devices: Fidelity Features.
Final rept. Aug 77-Feb 80,
Clarence A. Semple, Robert T. Hennessy, Mark S. Sanders, Barton K. Cross, and Barry H. Beith. Jan 81, 210p AFHRL-TR-80-36
Contract F33615-77-C-0067
Prepared in cooperation with Seville Research Corp. and United Airlines Flight Training Center.

This report presents relationships between aircrew training requirements and aircrew training device (ATD) fidelity features and degrees of fidelity. Research and operational experience information was used. Fidelity refers to the degree to which cue and response characteristics of ATDs allow for the learning and practice of specific training tasks. Visual system fidelity is addressed from the standpoints of visual system physical design and training effectiveness. Platform motion systems and their relationship to training effectiveness, efficiency and user acceptance are addressed. The design and use of force cueing devices (e.g. G-seats and arm loaders) and their relationship to platform motion and visual system cues are discussed. A conceptual training effectiveness framework is presented for use in assessing the training value of motion and force cueing. Flight characteristics fidelity, or the reproduction of aircraft control and response characteristics in an ATD, is examined to determine instructional values of having an ATD 'feel' like its aircraft counterpart. A conceptual framework is presented to guide training decisions about the need for high flight characteristics fidelity. The interaction of visual and motion system cues is discussed in terms of effects on training and performance of delays between related cues. (Author)

AD-A094 701/0 PC **A02**/MF **A01**
Washington Univ., Seattle. Graduate School of Business Administration.
The Effects of Participation and Goal Difficulty on Performance.
Technical rept.,
Gary P. Latham, Timothy P. Steele, and Lise M. Saari. Feb 81, 18p Rept no. TR-GS-6
Contract N00014-79-C-0680

Previous research comparing the effects of assigned versus participatively set goals on performance were essentially tests of the null hypothesis in that goal difficulty level was not systematically manipulated. The present laboratory study investigated the effects of assigned versus participatively set goals, and the effects of varying goal difficulty level on an arithmetic task. Eighty-six college students were assigned to either a participative goal condition or one of three assigned goal conditions. In two of the assigned goal conditions participants were assigned goals to those set in the participative condition, the difference being that individuals in one group were assigned goals at random and those in the other group were assigned goals on the basis of their premeasure scores. Participants in the third assigned goal condition were randomly assigned a goal in the top quartile of the goals set participatively. As hypothesized, individuals with hard assigned goals had higher performance than peers with lower goals set in a participative manner. Contrary to modern organizational theory, individuals with participatively set goals did not have higher performance than those with assigned goals of equal difficulty. Personality traits were not found to moderate the effects of goal setting on performance. (Author)

AD-A094 702/8 PC **A03**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH.
United States Air Force Quality of Air Force Life Active Duty Air Force Personnel Survey: 1980 Quick Look Report.
Final rept.,
Charles W. McNichols, T. Roger Manley, and Michael J. Stahl. Jul 80, 26p Rept no. AFIT-CI-TR-80-2

This report summarizes results of the third AF Quality of Life study accomplished in 1980. Major trends identified across the three studies center on increasing dissatisfaction with the economic aspects of military life, accompanied by smaller, but nevertheless positive, shifts in satisfaction with some of the non-economic factors such as work, leadership/supervision, equity, and personal growth. (Author)

AD-A094 704/4 PC **A11**/MF **A01**
Canyon Research Group, Inc., Westlake Village, CA.
Aircrew Training Devices: Life Cycle Cost and Worth of Ownership.
Final rept. Aug 77-Feb 80,
Kenneth E. Allbee, and Clarence A. Semple. Jan 81, 239p AFHRL-TR-80-34
Contract F33615-77-C-0067
Prepared in cooperation with Seville Research Corp. and United Airlines Flight Training Center, Denver, CO.

This report presents a life cycle model that was developed to use Air Force accounting system data to determine the cost of aircrew training and to differentiate between simulator and flight training costs. A hierarchical cost model is presented that relates training costs to cost interests of various levels of Air Force management. Sources of cost information are specifically identified. Selected cost data are presented, as is a computational example of how to use the model. Recommendations are made for enhancing the accuracy of some cost data. Training device worth of ownership also is addressed. Worth is defined as benefit; a procedure for quantifying worth is described. (Author)

AD-A094 768/9 PC **A11**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A System Dynamics Model for Assessing the Cost-Effectiveness of USAF Engineering Officer Compensation Policies.
Master's thesis,
Kenneth L. Williams. Dec 80, 235p Rept no. AFIT/GOR/OS/80D-7

This study formulates a methodology for evaluating alternative proposals to alleviate the Air Force's Development Engineering (28XX) officer shortage. Compensation was selected as the decision variable from 18 factors related to engineering officer career intent. A compendium of pertinent studies reviewed was also provided. The 28XX officer response to the most recent Air Force Quality of Life Survey indicate that salary has substantial influence on career motivation. The value, or productive capacity of the 28XX officer force was assumed to be a function of the numbers of Lieutenants, Captains, and Field Grade Officers assigned. Data elicited from an experienced Development Engineering officer were fit to a second-order polynomial using stepwise regression to provide an approximate ordinal indicator of relative productive capacity. A System Dynamics model was constructed to provide force and cost projections based upon exogeneous inputs of the future demand for engineers and salary policies. The model's accession and retention rates respond positively to increases in the ratio of future expected military pay to future expected civilian pay. Uses of the model were illustrated, but more extensive validation and parameter estimation is required before the model can be used with confidence in formulating policies. (Author)

AD-A094 796/0 PC **A03**/MF **A01**
Center for Naval Analyses, Alexandria, VA.
Labor Adjustment under Rational Expectations.
Professional paper,
Robert A. Levy, and James M. Jondrow. Dec 80, 40p Rept no. CNA-PP-282

This paper is an application of the theory of rational expectations to demand for labor in 11 two-digit industries. There were several specific goals: (1) to test the hypothesis that firms, to some extent, look past cyclical changes in determining their demand for output; (2) to try to explain the estimated finding of increasing returns to scale implied by most labor demand models; (3) to illustrate how the assumption of rational expectations is useful in distinguishing speeds of adjustment to different sources of output change--in our case, between cyclical changes and imports; (4) to make an explicit comparison with a model which assumes that expectations are static, i.e., the usual partial adjustment model. We find that in most of the industries, firms do take account of the future in their demand for labor. Taking account of the future lowers the estimated returns to scale. We find, too, that speeds of adjustment differ by the source of output change and that the expectations model has statistical properties superior to the static model. (Author)

AD-A094 797/8 PC **A02**/MF **A01**
Center for Naval Analyses, Alexandria, VA.
Wage Leadership in Construction.
Professional paper,
James M. Jondrow, and Robert A. Levy. Jan 81, 23p Rept no. CNA-PP-299

Wage leadership is the theory that wage increases in one sector lead to imitative increases elsewhere. In this paper we test this theory in a large industry where wage leadership is supposed to be dominant--construction. Alternate theories of

wage determination (excess demand, real wage bargaining) are also tested, along with the efficacy of the 1971-73 wage controls. (Author)

AD-A094 808/3 PC **A03**/MF **A01**
Bolt Beranek and Newman, Inc., Cambridge, MA.
Computer-Based Interactive Flight Training.
Final rept. Apr 77-Aug 80,
Wallace Feurzeig, George Lukas, and Dan Stefanescu. Nov 80, 45p BBN-4530, AFOSR-TR-81-0088
Contract F49620-78-C-0066

Computer-based methods were developed for describing the salient features of pilot performance on complex flight tasks. These methods extend and generalize a new approach to performance analysis expressly designed to mirror the procedures used by expert instructors in analyzing simulator flight data and diagnosing trainee errors. A data base for guiding the development of this instructor model of performance analysis was provided by a set of ILS approach tasks flown on the ORLY simulator. (Author)

AD-A094 819/0 PC **A07**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Human Factors Lab.
Automated Motor Skills Training Optimized for Individual Differences.
Final technical rept. 1 Oct 76-30 Sep 80,
Beverly H. Williges, and Robert C. Williges. Nov 80, 126p VPI-HFL-80-4-/AFOSR-80-1, AFOSR-TR-81-0077
Grant AFOSR-77-3161

This report summarizes a four-year research effort directed toward the implications of using both microadaption and macroadaption in individualizing motor skills training. A general review of the research effort as well as a specific discussion of the research conducted during 1 October 1979 to 30 September 1980 is provided. Overall conclusions on the efficacy of micro versus macromodels of motor skills training are provided. (Author)

AD-A094 848/9 PC **A05**/MF **A01**
Army Command and General Staff Coll., Fort Leavenworth, KS.
U.S. Air Force Considerations in Implementing a Specialized Pilot Program.
Master's thesis,
Stephen B. Sniteman. 6 Jun 80, 91p AD-E750 061

This study attempts to determine the considerations the Air Force would face in implementing a specialized pilot program. En route to this objective, one chapter of this thesis is devoted to each of five major factors. They are the importance of experience (Chapter II), warrant aviators as specialists (Chapter III) , the USAF position regarding pilot specialization (Chapter IV), analysis of educational criteria (Chapter V), and USAF selection program (Chapter VI). A final chapter, Chapter VII, deals with summary, conclusions, and recommendations. This research represents my interest in a House Appropriation Committee directive that mandated the Air Force allow 5% of the pilot force to specialize in aviation duties as warrant officers. It was concluded that a specialized pilot, as defined as a career aviator, was a viable and attractive option. Further examination revealed, however, that a USAF specialist system should be composed of college educated, officer pilots and not warrant officers. (author)

AD-A094 891/9 PC **A03**/MF **A01**
Training Analysis and Evaluation Group (Navy), Orlando, FL.
Field Test of Guidelines for the Development of Memory Aids in Technical Training.
Final rept.,
J. Peter Kincaid, Eduardo Salas, Richard Braby, and Jerry Martin. Dec 80, 40p Rept no. TAEG-TM-80-7
Original contains color plates: All DTIC reproductions will be in black and white.

The purpose of this study was to determine if Navy authors of instructional material could create effective memory aids for use in rote learning of material. A guidebook published by the Training Analysis and Evaluation Group was used in creating the memory aids. Navy school personnel used the guidebook to develop two training booklets incorporating memory aids. One booklet taught telephone codes for sound powered phones to sailors in Apprentice Training School. The other booklet taught sailors how to recognize and respond to 10 common navigation buoys. The booklets were evaluated in a classroom setting. (Author)

AD-A094 945/3 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Performance Changes on Military Qualification Tests during the First Term of Service,
William McNaught. Mar 80, 9p Rept no. RAND/P-6464

This paper briefly describes the results of a large Air Force experiment conducted during 1972-1973. This experiment analyzed the test performance of airmen after they had completed an initial term of service. Because the airmen were originally tested with the old Armed Forces Qualification Test (AFQT) and secondly with the new ASVAB, we have a unique opportunity to compare these two tests. In these results I find little evidence of bias in the ASVAB. In addition, these results strongly suggest that the AFQT scores received by recruits at enlistment are poor indicators of their later abilities to perform their military tasks. These results do not necessarily conflict with the statements of Pirie. The current difficulties have been attributed to the ASVAB as implemented in 1976, i.e., versions 5, 6, and 7. The results presented here undoubtedly relate to an earlier version of the ASVAB.

AD-A094 982/6 PC **A04**/MF **A01**
Army Command and General Staff Coll., Fort Leavenworth, KS.
Prepare the Fighter Force - Red Flag/Composite Force.
Master's thesis,
Ronald L. Rusing. 6 Jun 80, 74p AD-E750 047

This thesis addresses current realistic training capabilities and concentrates on two realistic training programs - Red Flag and Composite Force - providing an in depth study and single source document on all aspects of these programs. Current realistic training programs are helping prepare the fighter force for future contingencies. Realistic training concepts are gathering momentum and must continue to keep moving in a productive direction to maximize our military potential. Emphasis must be channelized on expanding and improving these programs. (Author)

AD-A095 006/3 PC **A04**/MF **A01**
Training Analysis and Evaluation Group (Navy), Orlando, FL.
Assessment of Surface Navy ECCM Training, 1975 to 1980.
Final rept.,
Ted E. Pearson, and Willard B. Stubbs. Dec 80, 55p Rept no. TAEG-TR-93

In 1975 the Training Analysis and Evaluation Group (TAEG) published the results of an analysis of surface Navy Electronic Counter-Countermeasures (ECCM) training (TAEG-15). Since the state of surface Navy ECCM readiness continues to be of concern, the Chief of Naval Education and Training tasked TAEG to update TAEG-15. This current report presents the TAEG-15 update. A study approach was derived that paralleled the previous study approach in order to maintain consistency between the two analyses. The present report contains a summary of TAEG-15 so that the radar will have a foundation for examining the data presented in the body of this report. (Author)

AD-A095 007/1 PC **A03**/MF **A01**
Training Analysis and Evaluation Group (Navy), Orlando, FL.
Computer Aided Training Evaluation and Scheduling (CATES) System: Assessing Flight Task Proficiency.
Technical rept.,
William C. Rankin, and William C. McDaniel. Dec 80, 28p Rept no. TAEG-TR-94

This report proposes a method for achieving improvements in the precision of determining Fleet Replacement Squadron student aviator proficiency. The proposed method is the Computer Aided Training Evaluation and Scheduling (CATES) system. It provides a computer managed, prescriptive training program based on individual student performance. (Author)

AD-A095 042/8 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Physics and Slavery: The Relative Cost of Calories for Slave Infants and Their Mothers,
Mark Myron Hopkins, and Nicholas Scott Cardell. Nov 79, 5p Rept no. RAND/P-6415

In Time On The Cross Robert Fogel and Stanley Engerman use as the rate of slave expropriation the percent of income produced by slaves that was not spent on their maintenance. The authors measure both income and maintenance in terms of expected present value evaluated at birth. They calculate the value of maintenance costs for slaves of different ages from the cost of per capita slave maintenance by using 'Atwater's weights.' In their review of Time On The Cross, Paul David and Peter Temin criticize this approach. They argue that the figure derived for slave maintenance cost is too high, because the food costs per calorie for children were lower than for adults. They maintain that there is 'some substantial basis for thinking that calories are provided in relatively inexpensive forms during childhood. Breast-feeding is an exemplary practice in this regard.' Since the methods employed by Fogel and Engerman give more weight to children than to adults, their value for maintenance costs would be biased upward. Therefore their rate of expropriation would be too low. The example of breast-feeding is the only support that David and Temin give for their contention that the cost per calorie was less for children than for adults.

AD-A095 050/1 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
National Health Insurance by Regulation: Mandated Employee Benefits,
Charles E. Phelps. Apr 80, 33p Rept no. RAND/P-6391

Social issues have often been solved, at least in part, by requiring that certain activities be undertaken by businesses on behalf of their employees. The entire social security system, workmen's compensation plans, and affirmative action for hiring of minorities are cases in point. The concept of using mandating as a portion of a national health insurance (NHI) plan arose during the Nixon administration and has been periodically (though not necessarily currently) embraced by such diverse entities as the administrations of Presidents Nixon and Carter, the U.S. Chamber of Commence, and prominent members of Congress of a variety of political persuasions from both major political parties. The broad political appeal for using mandated insurance appears to arise from several roots. First, it is 'off budget'. That is, a national health insurance plan can be structured without giving the appearance of affecting federal spending. Second, it gains the political support of a potentially powerful interest group: Because it retains an active role for the private insurance industry, it retains a market-oriented structure generally appealing to those desiring to minimize the appearance of government intervention.

AD-A095 071/7 PC **A08**/MF **A01**
Canyon Research Group, Inc., Westlake Village, CA.
Aircrew Training Devices: Utilization.
Final rept.,
Paul W. Caro, Jack B. Shelnutt, and William D. Spears. Jan 81, 153p AFHRL-TR-80-35
Contract F33615-77-C-0067

This report, prepared for personnel responsible for effective and efficient use of aircrew training devices (ATDs), identifies factors which influence ATD utilization and provides guidance concerning ATD use. Information upon which the report is based was obtained from reviews of the professional/technical literature, observations of ATD management and utilization practices, interviews with personnel involved in those practices, and visits to manufacturers and R & D agencies. Principal topics of the report are: (a) complexity of aircrew skills learning and adaptation of ATD usage to requirements for effective and efficient training;

(b) structure of ATD training in relation to the skills being trained and ATD capebilities; (c) instructor selection and training, management of ATD instructors in ways consistent with effective instructions; (d) development and maintenance of attitudes among instructors and students conducive to a favorable training environment; (e) assessment of ATD training effectiveness and use of assessment data to improve ATD training; and (f) maintenance of training quality after ATD programs become operational. This report is one of seven prepared under the Simulator Training Requirements and Effectiveness Study (STRES). (Author)

AD-A095 145/9 PC **A05**/MF **A01**
Army War Coll., Carlisle Barracks, PA.
The Battalion Commander's Handbook, 1980,
Jack A. Pellicci, Peter T. Berry, Craig H. Boice, Kenneth R. Dickinson, and Douglas A. Doehle.
Jun 80, 77p

This handbook was written primarily for the newly-selected battalion commander. It provides tips on how to transition into command and how to approach some of the more difficult problems. At the same time, however, a great deal of information in the book can be useful to commanders at any level. (Author)

PB81-150401 PC **A03**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
The Male Drinking Driver: Characteristics of the Offender and His Offence,
A. B. Clayton, P. E. McCarthy, and J. M. Breen.
c1980, 29p TRRL-SUPPLEMENTARY-600
Also pub. as ISSN-0305-1315.

The report describes a study performed in Birmingham, England. Motor vehicle operators were surveyed for offenses when drinking, and for characteristics and behavior.

PB81-150435 PC **A03**/MF **A01**
General Accounting Office, Washington, DC. Financial and General Management Studies Div.
The Navy's Computerized Pay System Is Unreliable and Inefficient-What Went Wrong.
Report to the Congress.
26 Sep 80, 40p FGMSD-80-71

During the past 12 years, the Navy has spent over $150 million to develop and operate a central automated military pay system for its military personnel. But the centralized system is so unreliable that, as a check, local disbursing officers calculate pay amounts manually. Each payday over 50 percent of the centrally computed pay amounts are changed to agree with amounts computed locally. GAO approved the design of the system but now finds that the Navy did not implement the design effectively. Also, the Navy made changes to the system which it did not submit for approval as required and which, if submitted, GAO would not have approved. The report makes several recommendations to the Secretary of Defense to improve the timeliness and accuracy of inputs to the automated system and to reduce the manual effort required to make the system work.

PB81-151318 PC **A07**/MF **A01**
ACTION/Peace Corps, Washington, DC.
Primary School Arts and Crafts: Developing Manual Skills, Lesson Plans. Classes I thru VI.
Information collection and exchange reprint series,
Mildred Douglass. Oct 80, 135p REPRINT R-37

This book, a lesson plan manual, is designed to be of assistance to primary school teachers who have had little training in Arts and Crafts, and for use in teacher training colleges. The book is not meant to be rigid or exhaustive. Lessons have been suggested for class levels in groups of I to III and IV to VI or for all classes. However, if some lessons appear too difficult or too simple for the suggested classes, they may be used in any manner the teacher chooses. For children who have never had any craft work, the simplest lessons would not be too easy. The teacher should feel free to improvise, change or vary the lessons.

PB81-151631 PC **A03**/MF **A01**
Minimum Wage Study Commission, Washington, DC.
Minimum Wage Noncompliance for Fully Subject Workers: 1973-1980.
Working paper no. 6,
Brigitte Sellekaerts, and Stephen W. Welch. Jan 81, 46p
Supersedes PB81-120198.

The paper discusses appropriate measures, presents estimates, and analyzes empirical findings of minimum wage noncompliance. It makes three contributions: (1) the sectoral noncompliance rates derived previously by Ashenfelter and Smith (1979) are demonstrated to be inadequate both from an analytic and policy perspective; (2) a new data base of consistent noncompliance measures (both absolute number of violations and noncompliance rates) for fully subject workers is constructed spanning the years 1973 through 1980 and disaggregated by region, sex, race, industry and age; and (3) changes in noncompliant behavior are explained by means of an econometric analysis using the pooled cross-section and time-series data.

PB81-152134 PC **A05**/MF **A01**
Minimum Wage Study Commission, Washington, DC.
A Demographic Profile of Minimum Wage Workers.
Working paper no. 4,
Curtis Gilroy. Dec 80, 79p
Supersedes PB81-123713.

The descriptive profile of minimum-wage workers uses data primarily from the Current Population Survey (CPS). Supplementary data from the Wage Distribution Survey and National Longitudinal Surveys support the analysis and are consistent with the findings of the CPS. Time-series and longitudinal patterns, in addition to cross section observations, are presented.

PB81-152332 PC **A07**/MF **A01**
Teknekron Research, Inc., Berkeley, CA.
An Analysis of the Status and Adequacy of the Workers' Compensation System for Compensating Victims of Occupational Disease.
Final rept. Sep 78-Sep 80,
Gerald I. Weber, and Miguel M. Lucero. Sep 80, 143p ASPER/CON-78/0151/A
Contract DL-J-9-M-8-0151

The primary objective of this study was to evaluate the adequacy of the Workers' Compensation system in providing compensation to workers disabled by respiratory disease. A quantitative portrayal of the experience of 784 respiratory disease claims with the Workers' Compensation system in four states - New Jersey, California, New York, and Michigan - is presented.

PB81-153454 PC **A05**/MF **A01**
Ohio State Univ., Columbus. Mershon Center for Education in National Security.
A Formative Evaluation of the Private Sector Initiative Program.
Rept. no. 4 (Interim).
Aug 80, 92p MEL-80-12
Grant DL-24-39-79-01
See also Rept. no. 3, PB80-159619, and Rept. no. 5, PB81-153462.

This is the fourth report in a series that evaluates implementation of the Private Sector Initiative Program (PSIP), established by Title VII of the Comprehensive Employment and Training Act (CETA), under which CETA prime sponsors seek to involve private business in local employment and training activities for the disadvantaged. The report is based on observation at 25 sites and covers developments through June 1980. The evaluators found that most sponsors advanced from the necessary institution building stage in 1979 to actual initiation of projects in mid-1980. They found two patterns developing -- one of sponsors who have focused goals and rapid implementation, and the other with broader goals with slower implementation -- and caution that is not yet possible to judge which is better. Another feature found is that a third of the sponsors had developed some customized training with a high level of employer involvement geared to the needs of an identified company or group of employers. These and other developments are traced in the report, which also analyzes well the various types of factors influencing the pace and nature of PSIP development in different sponsor settings.

PB81-153462 PC **A04**/MF **A01**
Ohio State Univ., Columbus. Mershon Center for Education in National Security.
A Formative Evaluation of the Private Sector Initiative Program.
Rept. no. 5 (Interim).
Jan 81, 64p MEL-81-02
Grant DL-24-39-79-01
See also Rept. no. 4, PB81-153454.

This is the fifth report in a series that evaluates implementation of the Private Sector Initiative Program (PSIP), established by Title VII of the Comprehensive Employment and Training Act (CETA), under which CETA prime sponsors seek to involve private business in local employment and training activities for the disadvantaged. The report, based on observation at 25 sites through late 1980, provides the first assessment of the Private Industry Councils (PICs) and comes up with indicators of progress against which it rates progress of the sample sponsors in launching PSIP operations.

PB81-155087 PC **A05**/MF **A01**
Veterans Administration, Washington, DC.
A Program to More Closely Integrate the Indianapolis V.A. Hospital Nursing Service and the Indiana University School of Nursing,
Ruby Kolozs. May 71, 85p VA/NPR-57

How can the current problem of polarity between nursing service and nursing education be resolved. How can climate for collaboration in nursing be cultivated in the University/VA Hospital complex. The search for answers to these questions led to the development of a practicable program involving nursing service and nursing education in this setting. The program was structured by the creation of the I.U.V.A. Nurse Practice Committee. The Nursing Council is composed of School of Nursing Faculty and V.A. nurses in administration and supervisory positions: Its primary purpose is the promotion of excellence in nursing service, nursing education and nursing research in the School of Nursing and VA Hospital. The goal of the Nurse Practice Committee is the improvement of nurse practice by identifying problems, utilizing available resources, planning and initiating change, and improving communication. Membership presently includes School of Nursing faculty in the clinical area, V.A. head nurses, clinical instructors and coordinators.

PB81-156044 PC **A09**/MF **A01**
Illinois Univ. at Urbana-Champaign. Inst. of Labor and Industrial Relations.
An Examination of the Social Factors Determining Successful Training Performance of Participants in Ex-Offender Manpower Programs: A Model for Predicting Social Behavior.
Masters' thesis (Final),
James Henderson Browne. 1980, 192p DLETA-91-17-79-30-1
Grant DL-91-17-79-30

The research assessed the relative contribution of various behavioral and cognitive factors in predicting the training performance of participants in ex-offender manpower tranining programs. A model for predicting social behavior developed by Triandis (1971, 1977) provided the theoretical framework for the study. Operationalization of the components in Triandis' model related measures used by behaviorists (i.e., habits) and cognitive psychologists (i.e., behavioral intentions) to various indicators of training program performance (i.e., training program completion, voluntary withdrawal from the training program with outside employment secured, voluntary withdrawal from the training program without outside employment secured, and non-voluntary withdrawal from the training program).

PB81-156465 PC **A10**/MF **A01**
Urban Systems Research and Engineering, Inc., Cambridge, MA.
Exploratory Evaluation of Head Start Training and Technical Assistance.
Final rept.

Nov 80, 206p
Contract DHEW-100-79-0033
Portions of this document are not fully legible.

The exploratory evaluation was designed to determine the overall objectives of Head Start training and technical assistance activities and to make recommendations, in the form of Management and Analysis Options, on how to improve the design, management, information systems, and decision-making of the program. Information was drawn primarily from program documents and interviews with Headquarters staff, staff of three Regions, six grantees, and twenty-one Training and Technical Assistance providers.

PB81-156523 PC **A16**/MF **A01**
Michigan Univ., Ann Arbor. Dept. of Economics.
Skidding and Bumping: Cyclical Patterns of Quality Adjustment of Labor Input.
Final rept.,
John A. Gardner. Oct 80, 372p DLETA-91-26-78-53-1
Grant DL-91-26-78-53

Skidding occurs when a person shifts from one job to another with less content, requiring less skill, intelligence, or experience. Bumping refers to the (direct or indirect) displacement of the person who would have held the lower-content job is no skidding had occurred. Job content is measured variously as income, occupational status, subjective perception of the employee. Data from the Michigan Income Dynamics Panel Study is used to calculate for 1969-1976 the annual proportion of job-changers who skid. Observations are restricted to male heads of households aged 25 to 64 who are not self-employed. The proportion varies from 15% to 30%. It varies inversely with annual aggregate employment growth, production growth, and capacity utilization, and it varies directly with aggregate unemployment. A logit model is used to predict likelihood of skidding for individual household heads. Aggregate economic conditions are found to be more important determinants of that likelihood than are such personal characteristics as age, family size, education, health status, income of other family members, and eligibility for unemployment compensation. A simple model is developed showing that if about 22% of job-changers skid, one would predict the two-to-one ratio of unemployment rates of blacks and whites.

PB81-158768 PC **A03**/MF **A01**
Veterans Administration, Washington, DC.
A Course Outline in Geriatric Care: A Trainee Project,
Edwin Woodcock. Mar 72, 42p VA/NPR-68

A course outline on geriatric care was developed to assist professional nurses in caring for the elderly patient in the general hospital setting. The course outline was developed through an extensive review of literature and through the development and distribution of a questionnaire to one hundred ten nurses at the Veterans Administration Hospital, Memphis. It was not the intent of this project to draw conclusions from the type of choices made by the nurses as they gave priority to various kinds of patient care. The results of the questionnaire solely allowed for input by the nurses into the construction of the course outline. Two major objectives were aimed at in developing this particular kind of course outline. First, that nurses be presented with a challenge through recognition that geriatric nursing care contains components which can stimulate the inquiring mind. Second, to place emphasis on the individual's response to the aging process rather than focus on the pathology of aging alone. This project is seen as a beginning attempt to develop a reservoir of teaching material for use by professional nurses in the Veterans Administration Nursing Service. Includes bibliography and appendices.

PB81-162513 CP **T02**
Department of Commerce, Washington, DC. Office of Federal Statistical Policy and Standards.
Standard Occupational Classification Manual 1980 (SOC).
Data file,
Milo Peterson, and Henry Utz. 1980, 1p COM/DF-81/002
Supersedes PB-286 961.
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB81-162521.

The SOC provides a statistical classification system for occupations that should make statistics compiled by different agencies much more comparable, as the Standard Industrial Classification does for industries. The 548-page Manual was developed to fill the need for a standard classification to be used in Federal and other programs in which occupational data were collected. The SOC, with over 600 occupational groups, in four levels is not expected to meet all the needs of all agencies but rather it is intended to be used as the framework which all surveys should use to provide comparability at some level with other occupational statistics. The system includes all occupations in which work is performed for pay or profit including family members in family-operated businesses. The SOC can be related to Dictionary of Occupational Titles, which was developed primarily for job placement and job analysis.

5J. Psychology (Individual and Group Behavior)

AD-A094 684/8 PC **A10**/MF **A01**
Center for Naval Analyses, Alexandria, VA. Marine Corps Operations Analysis Group.
A Reexamination of the Normalization of the Armed Services Vocational Aptitude Battery (LASVAB) Forms 6, 7, 6E, and 7E.
Final rept.,
William H. Sims, and Ann R. Truss. Apr 80, 212p Rept no. CNS-1152
Contract N00014-76-C-0001

This study checks the normalization of the Armed Services Vocational Aptitude Battery (ASVAB) forms 6 and 7 and normalized the ASVAB forms 6E and 7E. The ASVAB measures the mental aptitude of prospective recruits. Since ASVAB 6 and 7 were first used (January 1976) questions about the correctness of the normalization have been raised. We checked the normalization of ASVAB 6 and 7 and developed the normalization of 6E and 7E using a reference test--AFQT 7. In this effort we used a large sample of Marine Corps recruits. We found that the current normilization of ASVAB 6 and 7 is too easy; it overstates the mental ability of low aptitude recruits by 15 to 17 percentiles. (Author)

AD-A094 703/6 PC **A03**/MF **A01**
Decisions and Designs, Inc., McLean, VA.
Judged Lethality.
Technical rept.,
Baruch Fischhoff, and Don MacGregor. Dec 80, 48p
Contract MDA903-80-C-0194, ARPA Order-0194
Prepared in cooperation with Decision Research, Eugene, OR. Rept. no. PTR-1091-80-7.

Four methods were used to obtain estimates of the lethality of 20 maladies (i.e., the likelihood of dying from them given that an individual is afflicted). Although the estimates elicited by the different methods showed similar rank orderings, the actual values of these lethality rates varied greatly, from consistent overestimation of the true rate to consistent underestimation. No method proved initially to be demonstrably more accurate than the others. Aside from their practical implications, regarding the most effective way to inform people about such life-and-death issues, these results offer some hints as to the ways that such knowledge is stored and integrated in memory. (Author)

AD-A094 708/5 PC **A02**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
Test Anxiety and Response to Evaluation Stress.
Final rept. Oct 79-Dec 80,
Richard L. Hughes, and Dickie A. Harris. Dec 80, 13p Rept no. FJSRL-TR-80-0023

Electromyographic measures of frontalis muscle tension were collected from high and low-test-anxious subjects while they were performing a challenging tracking task. Self-report measures of subjective tension, actual tracking scores, and estimates of relative success on the tracking task were also collected. Subjects performed the tracking task following instructions designed to maximize or minimize evaluative apprehension. There were no statistically significant differences between high and low-test-anxious subjects on either the physiological or the performance measures. However, there were significant differences on the two other measures, suggesting a primary role of cognitive factors in test anxiety. High-test-anxious subjects described themselves as more tense, and they more harshly evaluated their own performances. In addition, there was some evidence that they were more prone than low-test-anxious subjects to construe situations as evaluative. (Author)

AD-A094 713/5 PC **A03**/MF **A01**
California Univ., San Diego, La Jolla. Center for Human Information Processing.
Attention to Action: Willed and Automatic Control of Behavior.
Technical rept. Feb 79-Dec 80,
Donald A. Norman, and Tim Shallice. 15 Dec 80, 42p Rept nos. CHIP-99, 8006
Contract N00014-79-C-0323, Grant PHS-MH-15828

The major theme of the paper is that the primary role of attention is in the control of action. The basic idea is that human action sequences can run themselves off, efficiently, smoothly, without any need for deliberate attention. However, when modifications in a plan must be made, or when it is desired that some novel alternative action sequence be followed, or when it is desired to prevent some habitual act from occurring, then it is necessary for deliberate attentional intervention into the process. We argue that most attentional conflicts occur with the initiation rather than the execution of actions. We suggest two levels of control: a contention scheduling mechanism that selects from among competing schemas; a supervisory attentional mechanism that biases the selection process. We propose that the supervisory attentional system is required where the action sequences are ill-learned or novel, where the action is highly critical or dangerous, or where planning is required. In other cases, selection is by contention scheduling alone. The result is three modes of the control of performance: automatic, contention scheduling without deliberate direction, and deliberate conscious control. Will becomes the application of attentional resources to the control of action. (Author)

AD-A094 784/6 PC **A06**/MF **A01**
Decisions and Designs, Inc., McLean, VA.
RSCREEN and OPGEN: Two Problem Structuring Decision Aids Which Employ Decision Templates.
Technical rept.,
Jonathan J. Weiss, and Clinton W. Kelly, III. Oct 80, 120p Rept no. TR-80-4-97
Contract N00014-79-C-0068, DARPA Order-3668

Decision templates are prestructured procedural aids for evaluating various alternative courses of action available to a decision maker. This report describes two computer-based decision aids which are structured using decision analytic methodology. The first aid, RSCREEN (Rapid SCREENing of decision options), is an interactive computer software program that assists decision makers in a crisis situation characterized by severe constraints on time, detailed information processing procedures, and training in evaluating several different courses of action. Each decision template in the RSCREEN aid encompasses the critical elements of the political-military situation in much the same manner as a well-developed contingency plan. For example, if a decision maker is faced with the immediate evacuation of diplomatic personnel from a hostile foreign country, he/she can draw on the RSCREEN aid for relevant data on evacuation procedures in general, and to assess his/her particular problem in light of these previous evacuation procedures.

AD-A094 801/8 PC **A02**/MF **A01**
Wisconsin Univ.-Madison. Graduate School of Business.

Personal Control at Work: Its Conceptualization and Measurement.
Technical rept.,
David B. Greenberger, Larry L. Cummings, and Randall B. Dunham. 3 Feb 81, 18p Rept no. TR-1-1-4
Contract N00014-79-C-0750

Numerous psychological researchers have proposed personal control over a variety of factors as an important variable in understanding human behavior, but the construct has been largely neglected by organizational psychologists. This paper discusses the construct personal control over work-related factors and the development of a means for measuring control over work-related factors. Two dimensions of control were found, one measuring the degree of control desired at work and the other measuring the degree of control possessed at work. These dimensions were observed to be very different from the locus of control construct. Analysis of the data indicate that the difference between control desired and control possessed may be an important mediating factor in job satisfaction. The use of control in redesigning jobs was discussed. (Author)

AD-A094 829/9 PC **A05**/MF **A01**
RAND Corp., Santa Monica, CA.
Differences in Spatial Knowledge Acquired from Maps and Navigation.
Interim rept.,
Perry W. Thorndyke, and Barbara Hayes-Roth. Dec 80, 81p Rept no. RAND/N-1595-ONR
Contract N00014-78-C-0042

Proposes models of the spatial knowledge people acquire from maps and navigation and the procedures required for spatial judgements using this knowledge. From a map people acquire survey knowledge encoding global spatial relations. This knowledge resides in memory in images that can be scanned and measured like a physical map. From navigation people acquire procedural knowledge of the routes connecting diverse locations. People combine mental simulation of travel through the environment and informal algebra to compute spatial judgments. An experiment in which subjects learned an environment from navigation or from a map evaluates predictions of these models. With moderate exposure, map learning is superior for judgments of relative location and straight-line distance among objects. Learning from navigation is superior for orienting oneself with respect to unseen objects and estimating route distances. With extensive exposure, the performance superiority of maps over navigation vanishes. These and other results are consonant with the proposed mechanisms. (Author)

AD-A094 863/8 PC **A02**/MF **A01**
Air Force Aerospace Medical Research Lab., Wright-Patterson AFB, OH.
Specifying Relevant Spatial Information for Image Evaluation and Display Design: An Explanation of How We See Certain Objects.
Journal article,
Arthur P. Ginsburg. 1980, 11p Rept no. AFAMRL-TR-79-9
Pub. in Proceedings of the SID, v21 n3 p219-227 1980.

No abstract available.

AD-A094 883/6 PC **A02**/MF **A01**
Military Academy, West Point, NY. Office of the Director of Institutional Research.
The Development of an Interest-Based Guidance Profile for Use in Academic Counseling,
John H. Shuford. Nov 80, 20p Rept no. 81-002
See also Rept. no. 79-006 dated Jun 79, AD-A072 275.

In June 1978, the Dean of the Academic Board requested that the Office of the Director of Institutional Research (ODIR) initiate a research project to develop techniques for providing objective guidance measures to assist cadets in the selection of their area of concentration. ODIR report 79-006 documented the results of the initial study. The current report documents the changes that were made to produce an operational system that was used in the academic counseling for the area of concentration/field of study selection for the USMA Class of 1982. The report describes in lay terms the procedures used to develop the Strong-Campbell Interest Inventory-based profiles used in the counseling sessions. More complete technical documentation is available at ODIR. The report also discusses some of the problems encountered and summarizes the conclusions and recommendations which have been made to the Dean and the DIR. An important recommendation, which has been approved, is to continue to refine the academic counseling system and produce interest-based profiles for the Class of 1983. (Author)

AD-A094 913/1 PC **A05**/MF **A01**
Advisory Group for Aerospace Research and Development, Neuilly-sur-Seine (France).
Spatial Disorientation in Flight: Current Problems.
Conference proceedings,
G. Perdriel, and A. J. Benson. Oct 80, 99p Rept no. AGARD-CP-287
Presented at the Aerospace Medical Panel Specialists' Meeting Held in Bodoe (Norway) 20-23 May 80.

Contents: Part I-Causes and Mechanisms of Spatial Disorientation; Part II-Visual Functions in Spatial Disorientation; Part III-Practical and Theoretical Aspects of Spatial Disorientation.

AD-A094 944/6 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Risk Assessment as a Subjective Process,
Ralph Strauch. Mar 80, 29p Rept no. RAND/P-6460
Presented at the Military Operations Research Symposium (44th) at Vandenberg AFB, 5 Dec 79.

Most extant approaches to risk assessment stress methodological and procedural solutions to the problem, in part because method and procedure are viewed as bulwarks against the fallibilities and limitations of human judgment. This paper examines the other side of that coin, the use of judgment and intuition as bulwarks against the fallibilities and limitations of formal methodology. Those limitations are described, and capabilities which judgment and intuition provide to compensate for them discussed. The paper calls for a greater synthesis of judgment and methodology, in which they aid and support each other instead of competing.

AD-A094 951/1 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Housing Search and Consumption Adjustment,
Kevin McCarthy. Apr 80, 41p Rept no. RAND/P-6473

This paper has two principal functions: First, to introduce a model for analyzing the effects of search on moving behavior; second, to present results suggesting how search procedures can affect moving behavior. Because the research from which these results are drawn is in its early stages, these results are not intended as tests of the underlying model; rather, they are designed to provide evidence on two assumptions underlying this analysis: First, that different households use different search strategies; second, that those search strategies can affect residential mobility outcomes. The next section, introducing the theoretical framework, begins with a discussion of the concepts underlying the model, compares this framework with others in the literature, and presents a three-stage search model. The following section describes the data base and presents some preliminary results. The final section summarizes those results and their implications for both substantive and policy issues.

AD-A095 084/0 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Terrorism in the United States,
Brian Michael Jenkins. May 80, 20p Rept no. RAND/P-6474

Many European officials have predicted that the United States will be hit by the kind of terrorism Western Europe experienced during the last decade and is still experiencing. Their reasoning derives not from any particular piece of intelligence that the United States is about to become a new theater of terrorist warfare, but from less specific indicators. Some of these European observers believe that the prominent American role in the Middle East will make the United States a target for terrorism if Palestinian aims are not satisfied. Some believe that Europe's terrorist groups will inspire American imitators. If there were an imminent domestic terrorist threat, these Europeans fear we would not know about it. They are dismayed by what they perceive as the deliberate destruction of the American intelligence apparatus abroad and in the United States. They believe that a nation of 200 million has more potentially dangerous subversive groups than the few now being monitored under the new stringent rules governing domestic security investigations.

AD-A095 091/5 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
A Three-Stage Model of Housing Search,
Kevin McCarthy. May 80, 30p Rept no. RAND/P-6487

Despite its importance in the residential mobility process, housing search as a determinant of moving behavior has been given scant attention in literature on the subject. Although limitations of data have contributed to this oversight, in large part it reflects the narrowness of particular disciplinary approaches, which typically focus on moving per se and thus simplify what is in fact a complex and multifaceted mobility process. As a result, even those studies which acknowledge the importance of the search process have failed to focus on it in a satisfactory way. Such studies divide into two types: formal models of the decision to move (Speare et al., 1975; Hanushek and Quigley, 1978) that recognize housing search as a transaction cost but rarely examine search behavior; and descriptive studies of search activity (Barresi, 1968; Hampel, 1969a and 1969b; Barrett, 1973) that lack a satisfactory theoretical structure for assessing how search affects mobility. Consequently, too little is understood about how households' moving decisions are shaped by the perceived benefits and costs of moving, how households' uncertainty about those benefits and costs influences their decisions to undertake an active search, or how various search costs affect moving behavior.

AD-A095 107/9 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Human Planning Processes.
Final rept.,
Barbara Hayes-Roth, Stephanie Cammarata, Sarah E. Goldin, Frederick Hayes-Roth, and Stanley Rosenschein. Dec 80, 48p Rept no. RAND/R-2670-ONR
Contract N00014-78-C-0039

This report summarizes a three-year research project investigating the cognitive processes underlying human planning behavior. The project focused on problems analogous to the naval tactical planning problem: How should the decisionmaker move force units from their current locations to particular task force objectives. Major project tasks included developing a cognitive model of the planning process, implementing the model as a computer simulation and evaluating its performance, and conducting empirical research to test the basic assumptions of the model and to identify important task and individual difference factors that affect the planning process. Based on the results of these research efforts, a preliminary set of guidelines are presented for improving the selection and training of planners and for designing effective planning aids. (Author)

AD-A095 138/4 PC **A03**/MF **A01**
Pittsburgh Univ., PA. Learning Research and Development Center.
Final Report for Contract N00014-78-C-0022 for the Period 1 October 1977-30 September 1980.
Technical rept.,
James G. Greeno. 26 Jan 81, 32p Rept no. TR-7
Contract N00014-78-C-0022

This project examined processes of informal reasoning and relationships between informal and formal reasoning in problem solving. One set of studies focused on relationships between knowledge of problem-solving procedures and knowledge of general conceptual relationships. We have specified ways in which problem-solving performance can be influenced, and problem-solving procedures can be understood, because of their rela-

tionships to conceptual knowledge in the form of schemata. The second set of studies was concerned with relationships between general formal principles and cognitive procedures. Contributions included a method for formally analyzing relationships between procedures and constraints, and a theoretical and empirical analysis of understanding the principle of formal deductive consequence in the context of geometry proof problems. (Author)

AD-A095 153/3 PC **A04**/MF **A01**
RAND Corp., Santa Monica, CA.
Estimation of Time Requirements during Planning: Interactions between Motivation and Cognition.
Interim rept.,
Barbara Hayes-Roth. Nov 80, 55p Rept no. RAND/N-1581-ONR
Contract N00014-78-C-0039

Human planners show a strong tendency to underestimate the time required for planned tasks. In addition, time stress increases this tendency. The more difficult it is to accomplish all tasks under consideration in the available time, the stronger the tendency to underestimate time requirements. In addition to documenting these effects, this note provides evidence for two underlying factors. A cognitive factor refers to people's tendency to plan at high levels of abstraction. Because they fail to enumerate all time-consuming components of planned tasks, they systematically underestimate the time required to performed the tasks as wholes. A motivational factor refers to people's desire to accomplish all or most of the tasks under consideration. This motivation biases them to underestimate required times. The note concludes with a discussion of methods for correcting underestimation of time requirements during planning. (Author)

PB81-158776 PC **A04**/MF **A01**
Veterans Administration, Washington, DC.
An Analysis of the Psychosocial Needs of the Veteran Patient,
Helen L. Gallena. 1971, 61p VA/NPR-62

A structured questionnaire using both open ended and closed statements was used to obtain information about the psychosocial needs of the hospitalized veteran and to discover if the needs of the Vietnam veteran differed from those of other patients. On the basis of this study, it appeared that similarities among the veterans of the various war periods were more pronounced than the differences. With the exception of the obvious difference, i.e., age, marital status, number of hospitalizations, etc., the only areas in which differences appeared were in the area of drug use and years of education. Some feelings of resentment towards authority were evident in the young patient as compared with the older veterans. Generally, all patients in the sample were displaying the same psychosocial needs in the period of hospitalization.

5K. Sociology

AD-A094 932/1 PC **A12**/MF **A01**
Institute for Water Resources (Army), Fort Belvoir, VA.
Chief Joseph Dam, Columbia River, Washington, Community Impact Reports,
Arthur A. Harnisch, William R. Burton, Kathryn G. Carssow, and Margaret A. Hadaway. May 80, 253p Rept nos. IWR-78-3, IWR-78-R2

This report consolidates four studies concerning economic and social community impacts related to construction activities at a hydropower dam in a rural area. Coverage is from preproject conditions and impact projections to a period of peak construction activity when projections were verified. Methodology for projecting number and place of residence of workers and related population is presented. Techniques for estimating capacity of community utilities and services is explained. Details are provided on mitigation methods to alleviate impacts to public schools. An indepth survey and analysis of the construction work force provides data on worker profiles and construction-related population. (Author)

AD-A094 940/4 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Housing Allowances: Lessons from the Supply Experiment,
Ira S. Lowry. Mar 80, 22p Rept no. RAND/P-6455
Presented at a Symposium of the Housing Delivery System Sponsored by the Center for Real Estate Education and Research, 4 Oct 79, Ohio State Univ., Columbus.

HUD's Experimental Housing Assistance Program (EHAP) consisted of several complementary experiments, each conducted in two or more of twelve sites that ranged from major metropolitan areas to rural counties. The Rand Corporation designed and conducted the Housing Assistance Supply Experiment in Brown County, Wisconsin (whose central city is Green Bay), and St. Joseph County, Indiana (whose central city is South Bend). The Supply Experiment's principal purpose was to learn how a fullscale allowance program would affect the housing market in which it was conducted. Beginning in 1974, we operated programs in each site that were open to all low-income renters and homeowners, and have monitored both the programs and the housing markets. Because early findings on market effects have been reported in other forums, this paper does not address that topic. Instead, it explains how a housing allowance program works and how the experimental program has affected those who participated in it: How many and what kinds of households have enrolled, what they did to meet the program's housing standards, how their housing expenditures changed after enrollment, and by how much their housing was improved. The paper concludes with comments on the policy implications of our findings.

AD-A094 941/2 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Electricity Prices and the Poor: What Are the Effects and What Can We Do,
Jan Paul Acton. Mar 80, 18p Rept no. RAND/P-6456
Presented at a Symposium on the Impact of Energy Prices on Low Income Populations, 28-29 Feb 80, Berkeley, CA.

Now we are abruptly against an important policy question: Do we have two laudable goals which are fundamentally inconsistent with one another' Is it possible to blunt the impact of rapidly rising energy prices on some of the customers without subverting the goals of prudent use in the long term. To answer this question we must step back and look at fundamental empirical evidence of the relationship between prices and the use of electricity; that is the subject of the first section. Second, we look especially at the evidence of differential impact by level of use or level of income. Finally, we will review in particular an electricity lifeline rate that was adopted in Los Angeles and evaluate it against these two social objectives of efficiency and improved well-being of lower income individuals. Without intending to give away the plot, I will tell you at the outset that there will be some pleasant surprises. Our analysis indicates that, at least under some circumstances, public policies can be designed to help the poor through the pricing mechanism without destroying the efficiency gains that are generally found with market prices that reflect the full costs of production and supply.

AD-A094 943/8 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Two Patrol Car Deployment Models: History of Use 1975-1979,
Jan M. Chaiken. Mar 80, 10p Rept no. RAND/P-6458

In 1975, Rand made available two computer programs for analyzing deployment of police patrol cars: the Patrol Car Allocation Model (PCAM) and the Hypercube Model. PCAM is used primarily to determine the total number of patrol cars a department needs and how they should be allocated over days of the week, hours of the day, and geography. The Hypercube Model is used primarily for designing patrol beats (the areas covered by one car). Both of these models were specifically designed to serve the needs of local police agencies with little or no outside technical assistance. The documentation for each includes a nontechnical executive summary that explains the kinds of applications for which the model is suitable, a user's manual that describes step-by-step how to operate the computer program once it is installed on a computer system, and a program description that provides information for data-processing personnel to install the model, construct a data base, and modify the model if needed. When the models were new, the designers undertook several field test in which they worked closely with police agencies to refine both the models and the methods of applying them. However, after publication of the documentation in 1975, Rand assistance to users has been limited. The designers have provided copies of the computer programs, fixed a few errors in the programs, responded to user inquiries, and provided advice to organizations that included the models in their training program.

AD-A095 105/3 PC **A02**/MF **A01**
Department of State, Washington, DC. Office of External Research.
Push Factor in Mexican Migration to the United States: The Background to Migration.
Final research rept.,
Robert M. Malina. Jul 80, 18p FAR-30027

The report is a summary and synthesis of the three studies comprising the contract/project: push factors in Mexican migration to the United States. Each of the reports is summarized, and then implications for policy on Mexican migration to the United States are presented. (Author)

AD-A095 124/4 PC **A14**/MF **A01**
Department of State, Washington, DC. Office of External Research.
Agrarian Structure and Labor Migration in Rural Mexico: The Case of Circular Migration of Undocumented Workers to the U.S.
Research rept.,
Kenneth David Roberts, and Gustavo Trevino Elizondo. Jul 80, 306p FAR-30024
Prepared in cooperation with Texas Univ., at Austin. Inst. of Latin American Studies.

The purpose of this study is to determine the specific agricultural conditions in Mexico which cause off-farm wage labor to take the form of undocumented migration to the U.S. The report reviews economic and anthropological migration literature and develops a migration model which is applied to 4 rural areas of Mexico. The principal conclusion to emerge from this research is that regional agricultural development will not necessarily stem the flow of migratory wage labor to the U.S. The Bajio, which contributed most heavily to the U.S. migration stream, was the most developed of the 4 zones studied, and within this zone there were no significant differences between migrant and nonmigrant households with respect to most economic indicators. Migrant households were found to be significantly larger through the incorporation of more adult members into the extended family. Higher farm incomes in that zone permit more individuals to claim a share of farm production, while lower farm labor requirements and higher cash outlays dictate that the majority of labor by these members will be in off-farm occupations. This household structure encourages U.S. migration by partially off-setting through occupational diversification the higher level of risk associated with this activity. (Author)

AD-A095 125/1 PC **A08**/MF **A01**
Department of State, Washington, DC. Office of External Research.
Socioeconomic Incentives for Migration from Mexico to the United States: Magnitude, Recent Changes, and Policy Implications.
Final rept.,
Michael E. Conroy , Mario Coria Salas, and F Vila-Gonza. Jul 80, 164p FAR-30025
Prepared in cooperation with Texas Univ. at Austin. Inst. of Latin American Studies.

The purpose of this report is to present new evidence of the magnitude of recent estimated real wage differentials for low-skill laborers across regions within Mexico and through the Southwestern United States; to show the trend in those wage differentials across recent years, with specific attention to the effect of recent devaluations of the Mexican peso; to broaden the analysis of socio-

economic incentives to a series of measures beyond real wages alone, and to suggest policy implications with respect to migration which emerge from this analysis of changing incentives in the context of broader interelationships between the two countries. (Author)

DOE/LC/10787-55 PC **A02**/MF **A01**
Geokinetics, Inc., Concord, CA.
Socio-Economic Impacts of GKI Activity.
D. L. Hutchinson. May 79, 5p
Contract FC20-78LC10787

The purpose of this report is to assess the potential socio-economic impacts of Geokinetics, Inc. (GKI) activities on Uintah Basin. Potential impacts on socio-economic conditions in the Uintah Basin are limited by the scope of GKI operations. In 1978, the population of Uintah and Duchesne counties was nearly 30,000. GKI employees represented 0.1% of the Basin population. 1978 Gross Taxable Sales were estimated to be $167.182 million for the Uintah Basin. GKI expenditures totaled less than 1% of gross taxable sales, even if it is assumed that all expenditures went to Basin businesses. GKI employment and expenditures are likely to increase in the years ahead, but projected increases will have insignificant socio-economic impacts on local communities. However, some employees will already own and others will seek to purchase homes in the area. Resulting impacts, though insignificant, will be positive. Several years ago, Utah State University researchers developed estimates of population changes and impacts associated with employment growth in Uintah County. Their report indicated that a project increasing basic employment by 400 persons would have minor impact, but would increase the tax base of the county. It is unlikely that GKI employment will approach, let alone exceed, the threshold level of 400 employees. In addition, GKI growth will be incremental and gradual, even to commercial scale operations. This leads us to conclude that GKI operations will have minimal adverse impact upon the Uintah Basin and in fact will probably have a net positive impact on the Basin. (ERA citation 06:008187)

N81-16826/2 PC **A07**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Fbi Fingerprint Identification Automation Study. Aids 3 Evaluation Report. Volume 1: Compendium.
B. D. L. Mulhall. 15 Nov 80, 135p NASA-CR-163903, JPL-PUB-80-79-V-1
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The primary features of the overall study are encompassed and an evaluation of an automation system is presented. Objectives of the study are described, methods of evaluation are summarized and conclusions about the system's feasibility are presented. Also included is a brief history of fingerprint automation activities within the FBI, the organization of the FBI, a bibliography of documents and records, a data dictionary and a reference set of all of the transparencies presented throughout the study.

N81-16827/0 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study. Aids 3 Evaluation Report. Volume 2: Technical Feasibility.
B. D. L. Mulhall. 15 Aug 80, 50p NASA-CR-163904, JPL-PUB-80-79-V-2
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The results of this effort are presented in a manner for use by both the AIDS 3 Operational and Economic Feasibility subtasks as well as the Development of Alternative subtask. The approach taken was to identify the major functions that appear in AIDS 3 and then to determine which technologies would be needed for support. The technologies were then examined from the point of view of reliability, throughput, security, availability, cost and possible future trends. Whenever possible graphs are given to indicate projected costs of rapidly changing technologies.

N81-16828/8 PC **A09**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study. Aids 3 Evaluation Report. Volume 3: Operational Feasibility.
B. D. L. Mulhall. 15 Nov 80, 185p NASA-CR-163905, JPL-PUB-80-79-V-3
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

An evaluation is presented which is defined as the adequacy of system design with known functional and performance requirements. The proposed Rockwell International AIDS 3 card, document and data flow are presented to summarize the concepts involved and the relationships between functions. The analysis and evaluation includes a study of system capability, processing rates, search requirements and response accuracy as well as a consideration of operational components and hardware integration. Results indicate that the AIDS 3 System concept is operationally feasible if production capacity is slightly enhanced but that operational complexity, hardware integration and a lack of conceptual data pertinent to some of the functions are areas of concern.

N81-16829/6 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study. Aids 3 Evaluation Report. Volume 4: Economic Feasibility.
B. D. L. Mulhall. 15 Nov 80, 97p JPL-PUB-80-79-V-4, NASA-CR-163906
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The results of the economic analysis of the AIDS 3 system design are presented. AIDS 3 evaluated a set of economic feasibility measures including life cycle cost, implementation cost, annual operating expenditures and annual capital expenditures. The economic feasibility of AIDS 3 was determined by comparing the evaluated measures with the same measures, where applicable, evaluated for the current system. A set of future work load scenarios was constructed using JPL's environmental evaluation study of the fingerprint identification system. AIDS 3 and the current system were evaluated for each of the economic feasibility measures for each of the work load scenarios. They were compared for a set of performance measures, including response time and accuracy, and for a set of cost/benefit ratios, including cost per transaction and cost per technical search. Benefit measures related to the economic feasibility of the system are also presented, including the required number of employees and the required employee skill mix.

N81-16830/4 PC **A08**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study: Aids 3 Evaluation Report. Volume 5: Current System Evaluation.
B. D. L. Mulhall. 15 Nov 80, 151p NASA-CR-163907, JPL-PUB-80-79-V-5
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The performance, costs, organization and other characteristics of both the manual system and AIDS 2 were used to establish a baseline case. The results of the evaluation are to be used to determine the feasibility of the AIDS 3 System, as well as provide a basis for ranking alternative systems during the second phase of the JPL study. The results of the study were tabulated by subject, scope and methods, providing a descriptive, quantitative and qualitative analysis of the current operating systems employed by the FBI Identification Division.

N81-16831/2 PC **A06**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study: Aids 3 Evaluation Report. Volume 6: Environmental Analysis.
B. D. L. Mulhall. 15 Nov 80, 108p NASA-CR-163908, JPL-PUB-80-79-V-6
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The results of the analysis of the external environment of the FBI Fingerprint Identification Division are presented. Possible trends in the future environment of the Division that may have an effect on the work load were projected to determine if future work load will lie within the capability range of the proposed new system, AIDS 3. Two working models of the environment were developed, the internal and external model, and from these scenarios the projection of possible future work load volume and mixture was developed. Possible drivers of work load change were identified and assessed for upper and lower bounds of effects. Data used for the study were derived from historical information, analysis of the current situation and from interviews with various agencies who are users of or stakeholders in the present system.

N81-16832/0 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study: Aids 3 Evaluation Report. Volume 7: Top down Functional Analysis.
B. D. L. Mulhall. 15 Aug 80, 28p JPL-PUB-80-79-V-7, NASA-CR-163909
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The functions are identified and described in chart form as a tree in which the basic functions, to 'Provide National Identification Service,' are shown at the top. The lower levels of the tree branch out to indicate functions and sub-functions. Symbols are used to indicate whether or not a function was automated in the AIDS 1 or 2 system or is planned to be automated in the AIDS 3 system. The tree chart is shown in detail.

N81-16833/8 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study: Aids 3 Evaluation Report. Volume 8: Measures of Effectiveness.
B. D. L. Mulhall. 15 Nov 80, 47p NASA-CR-163910, JPL-PUB-80-79-V-8
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The development of both quantitative criteria that were used to evaluate conceptional systems for automating the functions for the FBI Identification Division is described. Specific alternative systems for automation were compared by using these developed criteria, defined as Measures of Effectiveness (MOE), to gauge system's performance in attempting to achieve certain goals. The MOE, essentially measurement tools that were developed through the combination of suitable parameters, pertain to each conceivable area of system operation. The methods and approaches used, both in selecting the parameters and in using the resulting MOE, are described.

N81-16834/6 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
FBI Fingerprint Identification Automation Study: Aids 3 Evaluation Report. Volume 9: Functional Requirements.
15 Aug 80, 48p NASA-CR-163911, JPL-PUB-80-79-V-9
Contract NAS7-100
Sponsored in Part by the Dept. Of Justice.

The current system and subsystem used by the Identification Division are described. System constraints that dictate the system environment are discussed and boundaries within which solutions must be found are described. The functional requirements were related to the performance requirements. These performance requirements were then related to their applicable subsystems. The flow of data, documents, or other pieces of information from one subsystem to another or from the external world into the identification system is described. Requirements and design standards for a computer based system are presented.

PB81-141152 PC **A04**/MF **A01**
General Accounting Office, Washington, DC. Human Resources Div.
Guyana Tragedy Points to a Need for Better Care and Protection of Guardianship Children.
Report to the Congress.
30 Dec 80, 74p HRD-81-7

About one-third of the 913 individuals who died in the 1978 Peoples Temple tragedy in Guyana were children, few of whom were wards of adult members of the Peoples Temple. The tragedy raised

many questions about the adequacy of protection afforded children under the guardianship of adults not related to them. The Peoples Temple tragedy points to a need for the Department of State to establish specific procedures for reviewing passport applications for guardianship children. Furthermore, the Department of Health and Human Services should increase the protection afforded California guardianship children and make sure that they are not placed in homes with more children than can be adequately cared for. The Department should also recover Federal overpayments to States for guardianship children not eligible for foster care maintenance assistance.

PB81-154494 PC **A04**/MF **A01**
American Univ., Washington, DC. Inst. for Applied Public Financial Management.
A Study of FmHA Graduation Refinancing Policies with Other Lenders.
Final rept.,
James Wiseman. May 78, 65p 41-77-II
Sponsored in part by Farmers Home Administration, Washington, DC.

The Farmers Home Administration (FmHA) channels funds to farmers, rural residents, businesses, and communities. It helps rural people gain maximum benefit from loans and grants through counciling and technical assistance. Title V of the Housing Act of 1949 authorized FmHA to provide financial assistance to low and moderate income families who do not own adequate housing. Graduation is the FmHA term for the process of refinancing. This report recommends several improvements to the Graduation Policy, among which is a recommendation to make graduation or refinancing the responsibility of the borrower and not FmHA. Other recommendations are also included.

PB81-154502 PC **A06**/MF **A01**
American Univ., Washington, DC. Inst. for Applied Public Financial Management.
A Review of the Single Family Housing Loan Program in Meeting and Servicing the Needs of the Ill-Housed Population of Rural America.
Final rept.,
Paul J. Decker. Jul 80, 103p 75-78-IV
Sponsored in part by Farmers Home Administration, Washington, DC.

The Farmers Home Administration, an agency of the US Department of Agriculture, has as one of its missions the responsibility to provide safe, decent, and sanitary housing for the ill-housed population of rural America. The Agency has the authority to provide loans and grants to those eligible persons in rural America who cannot provide these necessities by conventional credit means. This study was designed to assess the factors which account for a borrower being designated delinquent and the resulting discrepancies in delinquency records; the rate of graduation to other sources of credit and reasons for non-graduation; and the degree of emphasis on outreach and targeting efforts.

PB81-165458 PC **A15**/MF **A01**
Georgia Inst. of Tech., Atlanta. Coll. of Architecture.
Provisions for Elderly and Handicapped Pedestrians. Volume 3. The Development and Evaluation of Countermeasures.
Final rept. Jun 74-Dec 79,
John A. Templer. May 80, 328p FHWA-RD-79-3
Contract DOT-FH-11-8504
See also Volume 1, PB80-198591.

Several Laboratory studies are described: firstly, an evaluation of various curb ramps; secondly, tactile surfaces for environmental cueing for the visually impaired; and thirdly, a compilation of the dimensions of wheelchairs currently available. Modifications aimed at eliminating certain environmental barriers were constructed in five cities and evaluated. These countermeasures include curb ramps, widened sidewalks, refuge islands, crosswalk markings, and a vehicle turn prohibition.

PB81-803744 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Rehabilitation of the Physically Handicapped. 1978-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1978-Feb 81.
Feb 81, 141p
Supersedes PB80-804008, and NTIS/PS-79/0006. See also 1964-1977, NTIS/PS-79/0005.

Social programs for the vocational rehabilitation of blind, deaf, epileptic, and other physically handicapped persons are described in the reports abstracted in the bibliography. Included are studies on methods, needs, individual programs, and program evaluation. (This updated bibliography contains 182 citations, 51 of which are new entries to the previous edition.)

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

AD-A094 642/6 PC **A02**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
Spontaneous Growth Hormone Release in Tethered Cynomolgus Monkeys.
Interim rept.,
David L. Bunner, George A. McNamee, Jr., Richard E. Dinterman, and Robert W. Wannemacher, Jr. 25 Nov 80, 21p

In order to determine spontaneous growth harmone GH release patterns in unsedated and unrestrained nonhuman primates a jacket and tethering system were used to study 6 cynomolgus monkeys. Hourly blood samples were collected and body temperatures recorded over 8- and 24-h periods. Measurements of GH, glucose, beta-hydroxybutyrate and free fatty acids (FFA) were made on all samples. Conclusions: GH in unsedated, unrestrained cynomolgus monkeys was released in 4-5 h cycles without increased nighttime release. A brief period of self-feeding caused a lowering of GH concentration followed by a rebound increase. These changes could be eliminated by fasting. The tethering system allowed repeated sampling of blood and reading of temperature over extended periods of time without disturbing the monkeys and still allowed self-feeding, grooming and socializing.

AD-A095 160/8 PC **A02**/MF **A01**
Armed Forces Radiobiology Research Inst., Bethesda, MD.
Structural and Ionic Events during Leukocyte Chemotaxis,
John I. Gallin, Elaine K. Gallin, Harry L. Malech, and Eva B. Cramer. 1978, 21p
Pub. in Leukocyte Chemotaxis, p123-141 1978.

No abstract available.

AD-A095 167/3 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Effects of Ascorbic Acid Deficiency and of Erythorbic Acid on Blood Components in the Cynomolgus Monkey.
Final rept.,
J. David Turnbull, Howerde E. Sauberlich, and Stanley T. Omaye. 14 Nov 78, 13p Rept no. LAIR-79-053
Pub. in International Jnl. for Vitamin and Nutrition Research, v49 n1 p92-102 1979.

No abstract available.

BNL-28713 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Ribonuclease III.
J. J. Dunn. 1980, 28p
Contract AC02-76CH00016

RNase III of Escherichia coli is the endonuclease responsible for the first steps in the post-transcriptional processing of E. coli ribosomal RNA. The purification and structure of RNase III are discussed. The action of RNase III in cleaving double-stranded and single-stranded RNA is briefly reviewed. (ERA citation 06:008191)

LA-tr-80-20 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Exp 13 C NMR Study of a Derivative Uniformly Enriched in exp 13 C. Sign of the Values of the Coupling Constants Observed.
D. Gagnaire, H. Reutenauer, and F. Taravel. 1979, 16p
Contract W-7405-ENG-36
A, Org. Magn. Resonance, 12 n12 P679-683 1979.

Products of biosynthesis of cellulose by Acetobacter xylinum from exp 13 C-enriched precursors were studied using NMR. Two conclusions were drawn from the study of the exp 13 C- exp 13 C couplings across two or three links and their sign: (1) for couplings across three links, a positive value is expected; and (2) for the /sup n/J(exp 13 C-2, exp 13 C-4) coupling, resultant of a exp 2 J coupling and a exp 3 J coupling, a positive value was found. (ERA citation 06:008192)

PB81-803769 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Molecular Biology. February, 1979-February, 1981 (Citations from the NTIS Data Base).
Rept. for Feb 79-Feb 81.
Feb 81, 74p
Supersedes PB80-804024, and NTIS/PS-79/0050. See also 1964-January, 1979, PB80-804016.

The bibliography cites references on the molecular structure, properties, and reactions of biomolecules. Research is included on enzymes, nucleic acids, ribosomes, chromatin, mitochondria, microsomes, and other cellular components. Other topics discussed are the molecular and cellular basis of carcinogenesis, pathogenesis, and tissue responses to toxic substances. (This updated bibliography contains 65 citations, 26 which are new entries to the previous edition.)

PB81-859506 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Digoxin Assay Methodology and Technical Problems. January, 1976-November, 1980 (Citations from the Energy Data Base).
Rept. for Jan 76-Nov 80.
Feb 81, 78p NERACEDBNT3223

This retrospective bibliography contains citations concerning methodology and technical problems that are encountered during assay for digoxin. Many methods are discussed and compared. These included RIA, EMIT, ELISA, EIA among others. Technical problems encountered, problems with cross reactions and other sources of error are cited. (Contains 74 citations, fully indexed and including a table of contents.)

6C. Biology

AD-A094 873/7 PC **A06**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Specialized Genetic Recombination Systems in Bacteria: Their Involvement in Gene Expression and Evolution,
D. J. Kopecko. 1980, 102p

Intermolecular exchange of a DNA segment, that is, genetic exchange or crossing over between homologous parental chromosomes resulting in the formation of a hybrid molecule, has long been recognized. This marvelous process is important in providing the breadth of phenotypic diversity seen within a single plant or animal species. Classical genetics and recent studies in molecular genetics have revealed a variety of genetic exchange sys-

tems in bacteria. These recombination systems can be divided into two broad categories: (a) generalized, and (b) specialized. In short, general recombination systems mediate genetic interchange at random points between largely homologous deoxyribonucleotide segments, whereas specialized recombination processes act in the absence of general recombination or apparent sequence homology between the interacting DNA regions. Specialized recombination systems are responsible for promoting the integration, deletion, transposition, or inversion of discrete DNA segments and can also influence the expression of nearby genes. Bacterial evolution was thought until recently to occur by a slow process involving small chromosomal alterations (i.e., mutations), environmental selection for the desirable mutations, and the accumulation of beneficial mutations through intercellular genetic exchange and generalized recombination. Mutational events which involve the addition, deletion, or substitution of only one or a few nucleotides can be called micro-evolutionary. Since the 1960's, however, a catalog of macro-evolutionary events has been amassed.

AD-A095 000/6 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Rearing of Diamanus Montanus (Siphonaptera: Ceratophyllidae) and Hoplopsyllus anomalus (Siphonaptera: Pulicidae).
Final rept.,
L. C. Rutledge, M. A. Lawson, L. L. Young, and M. A. Moussa. 1978, 2p Rept no. LAIR-79-041
Pub. in Jnl. of Medical Entomology, v15 n3 p304, 23 Mar 79.

No abstract available.

DOE/EV/04472-3 PC **A02**/MF **A01**
Case Western Reserve Univ., Cleveland, OH.
Relationship of DNA Repair Processes to Mutagenesis and Carcinogenesis in Mammalian Cells. Progress Report, November 1, 1979-October 31, 1980.
H. H. Evans. Oct 80, 21p
Contract AS02-77EV04472

The objective of this research is to determine the role of DNA repair in mutagenesis and carcinogenesis in mammalian cells. Use of the host-cell reactivation viral suicide enrichment procedure was initiated in the isolation of repair-deficient mutants. Lightly mutagenized BHK cells were infected with irradiated Herpes simplex virus (HSV); several radiation-sensitive strains were isolated among the survivors of the infection. The characterization of these strains is progressing and the enrichments are continuing. That alterations in the frequency of mutation of C3H/10T 1/2 cells, occurring as a result of holding the cells in a confluent state following treatment with ethylmethane sulfonate, parallel the alterations in the frequency of neoplastic transformation was found. The repair capabilities of BHK cells were found to be intermediate in comparison to repair-proficient and -deficient human cells with regard to the reactivation of HSV treated with various inactivating agents. The effect of confluency and of low serum levels on DNA synthesis, as well as the response to the cytotoxic effects of MNNG and acriflavin were determined in BHK cells in preparation for the investigation of the role of DNA repair in mutagenesis and transformation. It was also found that C3H/10T 1/2 cells partially recover from the toxic effects of 4-nitroquinoline-1-oxide if they are held in a confluent state for 6 to 22 hrs following treatment. Addition of catalase did not alleviate the toxic effects of 4-NQO. The cells contain a relatively high endogenous level of this enzyme. (ERA citation 06:008233)

DOE/EV/04472-4 PC **A02**/MF **A01**
Case Western Reserve Univ., Cleveland, OH.
Relationship of DNA Repair Processes to Mutagenesis and Carcinogenesis in Mammalian Cells. Progress Report, August 1, 1977-October 31, 1980.
H. H. Evans. Oct 80, 23p
Contract AS02-77EV04472

The objective of this research is to determine the role of DNA repair in mutagenesis and carcinogenesis in mammalian cells. More specifically, mutant strains will be selected which are deficient in various DNA repair pathways. These strains will be studied with regard to (1) the nature of the defect in repair, and (2) the mutability and transformability of the defective cells by various agents as compared to the wild type parental cells. The results to date include progress in the following areas: (1) determination of optimum conditions for growth and maintenance of cells and for quantitative measurement of various cellular parameters; (2) investigation of the effect of holding mutagenized cells for various periods in a density inhibited state on survival and on mutation and transformation frequencies; (3) examination of the repair capabilities of BHK cells, as compared to repair-proficient and repair-deficient human cells and excision-deficient mouse cells, as measured by the reactivation of Herpes simplex virus (HSV) treated with radiation and ethylmethane sulfonate (EMS); (4) initiation of host cell reactivation viral sucide enrichment and screening of survivors of the enrichment for sensitivity to ionizing radiation; and (5) investigation of the toxicity, mutagenicity, and carcinogenicity of various metabolites of 4-nitroquinoline-1-oxide (4-NQO). (ERA citation 06:008234)

DOE/LC/10787-57 PC **A04**/MF **A01**
Olgeirson (Erik R.) Associates, Conifer, CO.
Ecoclimate Studies.
E. R. Olgeirson. Jun 79, 51p
Contract FC20-78LC10787

Data are rported on ecoclimatic studies on the Geokinetics Shale Group Field Research Site in Uintah County, Utah. Amount of precipitation, ambient air temperature, soil surface temperature, and soil moisture parameters were measured during the growing season (April through November). Recording systems were established in each of the 4 major vegetational types. The purpose is to obtain climatic data from the environmental zone that has the greatest influence on plant distributions and growth. (ERA citation 06:008115)

N81-16718/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Life of the Onion Not Knowing Up from down.
A. Gordeyev. Aug 80, 9p NASA-TM-76353
Contract NASW-3199
Transl. Into English from Znaiye - Sila, (USSR), V. 12, No. 630, Dec. 1979 p 9-10. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The absence of the force of gravity has a negative effect on plant life. Plants grown on spacecraft have died prematurely. Tests are being made to discover whether or not electricity will compensate for the absence of gravitation. It was found that an onion under current is not subject to the force of gravity. Tremendous possibilities are opened up by these experiments.

PB81-144925
(Order as PB81-144909, PC **A06**/MF **A01**)
Museo Nacional de Historia Natural, Montevideo (Uruguay).
Developments in South American Squid Fisheries,
Marcelo Juanico. Aug 80, 6p NOAA-80112805-2
Included in Marine Fisheries Review, v42 n7-8 p10-14, Jul-Aug 80.

The only important squid catches in South America are the Argentinian ones, and to a much less extent those of Uruguay. Estimates of squid potential yields near the continent will be available at short term only on this resource (Illex argentinus). The lack of suitable data on other South American squid stocks makes impossible estimating the feasibility of a future development of this kind of fishery.

PB81-144933
(Order as PB81-144909, PC **A06**/MF **A01**)
Department of Fisheries and Oceans, St. John's (Newfoundland). Research and Resource Services.
Recent Developments in the Squid, 'Illex illecebrosus', Fishery of Newfoundland, Canada,
Geoffrey V. Hruley. Aug 80, 9p NOAA-80112805-3
Included in Marine Fisheries Review, v42 n7-8 p15-22, Jul-Aug 80.

Developments in the squid fishery in Newfoundland over the past few years have included noteworthy changes in the management, harvesting, processing, and marketing of squid. The implications of international involvement in the squid fishery and Canada's increased offshore fisheries jurisdiction are discussed.

PB81-144958
(Order as PB81-144909, PC **A06**/MF **A01**)
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
Squid Catches Resulting from Trawl Surveys off the Southeastern United States,
J. David Whitaker. Aug 80, 6p CONTRIB-114, NOAA-80112805-5
Included in Marine Fisheries Review, v42 n7-8 p39-43, Jul-Aug 80.

Due to the rising value of the squid fishery and increased interest in expanding the domestic fishery, underexploited squid stocks south of Cape Hatteras and in the Gulf of Mexico are being more closely examined. The surveys conducted in the Atlantic Ocean off the southeastern United States since 1973 have provided the first comprehensive trawl data for squid in these waters. Some observations on the distribution and abundance of squid are presented. Four species are common in the continental shelf waters in this area.

PB81-144966
(Order as PB81-144909, PC **A06**/MF **A01**)
Texas Univ. Medical Branch at Galveston. Marine Biomedical Inst.
Squid Fishery in Texas: Biological, Economic, and Market Considerations,
Raymond F. Hixon, Roger T. Hanlon, Samuel M. Gillespie, and Wade L. Griffin. Aug 80, 8p NOAA-80112805-6
Included in Marine Fisheries Review, v42 n7-8 p44-50, Jul-Aug 80.

Presently no major squid fishery exists in the Gulf of Mexico, although the shelf forms, Loligo pealei, Loligo plei, and Lolliguncula brevis, occur throughout the Gulf. The constraints that hinder the development of the fishery are examined, using Texas as a model. Several biological, economic and marketing problems were identified that indicate a squid fishery is not viable in Texas at this time, although future potential for one exists.

PB81-144974
(Order as PB81-144909, PC **A06**/MF **A01**)
Massachusetts Div. of Marine Fisheries, Sandwich.
Experimental Fishing for Squid with Lights in Nantucket Sound,
Elizabeth H. Amaral, and H. Arnold Carr. Aug 80, 7p NOAA-80112805-7
Included in Marine Fisheries Review, v42 n7-8 p51-56, Jul-Aug 80.

Harvesting squid by light attraction techniques has been practiced on the U.S. west coast since late in the 19th century. This project capitalized on the existing technology from Japan and the U.S. and applied these methods to Nantucket Sound, an area where squid are known to be abundant in May and June. The report describes the harvesting operations and fishing gear performance.

PB81-144982
(Order as PB81-144909, PC **A06**/MF **A01**)
National Marine Fisheries Service, Gloucester, MA. Gloucester Lab.
Experimental Pair Trawling for Squid in New England,
Alan J. Blott. Aug 80, 4p NOAA-80112805-8
Included in Marine Fisheries Review, v42 n7-8 p57-59, Jul-Aug 80.

The use of a bottom pair trawl for catching squid was examined in this study. The object was to determine the commercial feasibility of harvesting winter squid with the pair trawl.

PB81-144990 (Order as PB81-144909, PC **A06**/MF **A01**)
National Marine Fisheries Service, Gloucester, MA. Gloucester Lab.
Experimental Jigging for Squid off the Northeast United States,
Doublas Long, and W. F. Rathjen. Aug 80, 8p NOAA-80112805-9
Included in Marine Fisheries Review, v42 n7-8 p60-66, Jul-Aug 80.

Illex illecebrosus is very agressive and exhibits an attractive taxis toward light which lends very well to night light jigging. Squid jigging is a fishing technique that is relatively simple in operation when compared with a trawl fishery. Since the jigging machine is fully automatic only a few men are required to run a dozen machines. Squid coming off the jigs are alive and in very good condition since the jig barbs put only a tiny hole in the tentacle. This leads to a high quality frozen product.

PB81-149130 PC **A03**/MF **A01**
Neushul Mariculture, Inc., Goleta, CA.
Experimental Macroalgal Mariculture.
Quarterly rept. no. 5, 1 Jul-30 Sep 80,
M. Neushul. Nov 80, 40p NSF/RA-800335
Grant NSF-PFR79-11715
See also quarterly rept. no. 4, dated Aug 80, PB81-127870.

Recent efforts and the continuing environmental monitoring of oceanographic conditions are reported. The growth of farmed macroalgae has been enhanced by employing nutrient irrigation. Growth rates for the agarophyte, Gelidium, were maximally 1.26 percent/day for fertilized plants during the low-nutrient period. These plants were provided with 0.18gm of fertilizer per day per plant. This is the highest yield obtained to date for nutrient irrigated plants. The growth of Macrocystis was very rapid. Plants grew at 2.9 to 3.8 percent per day. The seed stock was obtained from stored gametophytic cultures in the laboratory. It is now comparatively easy to make controlled crosses and propagate, plant, and grow Macrocystis in the sea.

PB81-153694 PC **A03**/MF **A01**
Walter Reed Army Medical Center, Washington, DC. Army Inst. of Dental Research.
Identification of Leukocyte Subpopulations Responsible for the Production of 'Osteoclast Activating Factor' and Their Role in Bone Resorption.
Final rept. Oct 77-Sep 80,
Charles E. Hawley. 31 Dec 80, 39p NIDR/CR-81/03

Osteoclast Activating Factor (OAF) was predictably produced in large volume mitogen stimulated MNC cultures. OAF production was independent of DNA synthesis. OAF was produced in mixed leukocyte cultures containing heat inactivated fetal calf serum. OAF production was independent of blastogenesis. OAF activity was isolated in the molecular weight range of 12,000 to 25,000 daltons by S-200 Sephacryl chromatography and high performance liquid chromatography (HPLC). OAF activity was concentrated across membranes and by ammonium sulfate precipitation. Subsequent HPLC produced two peaks of bone resorbing activity: a major peak at 18,000 daltons and a minor peak at 9,000 daltons. MNC culture supernatants also contained high concentrations of low molecular weight prostaglandins which also are believed to be osteolytic in vitro.

PB81-154197 PC **A09**/MF **A01**
Gulf States Marine Fisheries Commission, Ocean Springs, MS.
Shrimp Recreational Fisheries Statistics Data Collection and Analysis.
Completion rept. May 78-Feb 80,
Gary L. Brown, Dhirendra N. Ghosh, Robert Gurskey, and Peggy Hancuff. Nov 80, 178p NOAA-80123109
Prepared in cooperation with Human Sciences Research, Inc., McLean, VA.

The principal objective of the survey of recreational shrimpers was to collect information on the effort of recreational shrimpers and on their inshore shrimp catch by species and size composition. This data is needed to help make better decisions regarding management measures for the bay and sound systems in the Gulf.

PB81-158149 (Order as PB81-157984, PC **A16**/MF **A01**)
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
Transportation of Chinook Salmon, 'Oncorhynchus tshawytscha', and Steelhead, 'Salmo gairdneri', Smolts in the Columbia River and Effects on Adult Returns,
Wesley J. Ebel. Dec 79, 15p NOAA-80120401-16
Included in Fishery Bulletin, v78 n2 p491-505 Apr 80.

Chinook salmon, Onchorhynshus tshawytscha, and steelhead, Salmo gairdneri, were captured at Little Goose Dam in the Snake River during their seaward migration and transported 400 km downstream to the lower Columbia River below Bonneville Dam. Their survival was increased from 1.1 to 15 times as compared with control fish which passed by seven mainstem low-level dams and reservoirs.

PB81-160699 (Order as PB81-160616, PC **A04**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Genetics.
A Simple Method of Culturing Amniotic Fluid Cells,
Zhou Xianting, Tang Huoshun, Li Jinxia, and Li Shuhua. Aug 80, 4p
Prepared in cooperation with Chinese Academy of Medical Sciences, Beijing. Capital Hospital.
Included in Chinese Medical Jnl., v93 n8 p553-555 1980.

A simple method of culturing amniotic fluid cells for detection of fetal chromosome abnormalities and genetic diseases is presented. 26 cases were studied by this method with 92% success rate.

PB81-803819 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Auditory Perception in Cetacea. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 107p
Supersedes PB80-803927, and NTIS/PS-79/0007.

The selected abstracts cover acoustic signals, sound signals, sonar detection, echo sounding, underwater acoustics, echo ranging, animal navigation, echo location, and animal communication as well as auditory perception in cetacea. (This updated bibliography contains 98 citations, 1 of which is a new entry to the previous edition.)

6D. Bionics

PB81-804106 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Artificial Intelligence. 1970-January, 1981 (Citations from the NTIS Data Base).
Rept. for 1970-Jan 81.
Feb 81, 249p
Supersedes PB80-803802, and NTIS/PS-79/0002.

Many subfields of artificial intelligence are cited in this bibliography. These include natural language generation by computer, learning machines, question answering systems, theorem proving, and speech understanding. (This updated bibliography contains 241 citations, 33 of which are new entries to the previous edition.)

6E. Clinical Medicine

AD-A094 638/4 PC **A02**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
The Role of Zinc on Neutrophil Function,
William R. Beisel. 24 Nov 80, 16p

The availability of zinc within the body can modulate the functional activities of neutrophils, including their abilities to mobilize, to adhere to surfaces, to take up oxygen and particulate matter, and to kill microorganisms. Very low or very high zinc concentrations are detrimental to these functions. A physiologic control mechanism appears to help regulate plasma zinc concentrations in a manner that would improve neutrophil functions. The role of alkaline phosphatase, a neutrophilic zinc-metalloenzyme is still uncertain. (Author)

AD-A094 639/2 PC **A03**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
Hepatic Concentration and Distribution of Coenzyme A and Carnitine during a Streptococcus pneumoniae Infection in the Rat: Possible Implications on Fatty Acid Metabolism and Ketogenesis.
Interim rept.,
Judith G. Pace, Francis A. Beall, Harold A. Neufeld, and Robert W. Wannemacher, Jr. 9 Jan 81, 38p

Rats infected with Streptococcus pneumoniae were used to study the effect of pneumococcal infection on the hepatic concentrations and the subcellular distribution of carnitine and coenzyme A (CoA). Compared to fasted control rats, fasted-infected rats have a decreased ketogenic capacity that is associated with an accumulation of total hepatic carnitine and a decrease in total hepatic coenzyme A. The concentration of competing substrates (e.g., lactate and pyruvate) and nucleotide ratios (e.g., (Acetyl-CoA)/(CoA), (ATP)/(ADP)(HPO4(2-)), and (NAD+)/(NADH)) are also variably affected by the infection. The concentrations of both lactate and pyruvate and the mitochondrial ratio of (NAD+)/(NADH) increased, while mitochondrial (acetyl-CoA)/(CoA) and the phosphorylation state or the (ATP)/(ADP)(HPO4(2-) ratio decreased compared to fasted controls.

AD-A094 643/4 PC **A03**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
The Action of Botulinum Toxin at the Neuromuscular Junction,
Lawrence C. Sellin. 22 Dec 80, 36p

Botulism results from the action is of a protein neurotoxin (MW approx. 150,000) produced by the bacterium Clostridium botulinum, of which there are eight known strains. Botulinum neurotoxin is the most potent biological toxin known, having a median lethal dose of 5-50 ng/kg body weight. The primary site of action of botulinum toxin is the cholinergic nerve terminal, where it blocks the release of the neurotransmitter acetylcholine. Death usually results from respiratory failure. Nonlethal doses of botulinum toxin can induce sprouting of the nerve terminal and have significant postsynaptic effects, including muscle atrophy and alterations in the membrane electrical properties of the muscle fiber. There is no universally available treatment for botulinum intoxication. However, immunotherapeutic and chemotherapeutic procedures are now being developed and will be discussed. (Author)

AD-A094 646/7 PC **A02**/MF **A01**
National Naval Dental Center, Bethesda, MD.
Evaluation of the Immunogenicity of Freeze-Dried Skin Allografts in Humans.
Final rept. for period ending 1980,
Marlin E. Gher, Jr., John E. Williams, Jr., Arthur R. Vernino, Douglas M. Strong, and George B. Pelleu, Jr. 1980, 11p Rept no. NNDC-TR-054
Pub. in Evaluation of Skin Allografts, v51 n10 p571-577 Oct 80.

No abstract available.

AD-A094 648/3 Not available NTIS
Army Inst. of Surgical Research, Fort Sam Houston, TX.
Free T4, Free T3, and Reverse T3 in Critically Ill, Thermally Injured Patients,
Richard A. Becker, Douglas W. Wilmore, Cleon W. Goodwin, Jr., Claudia A. Zitzka, and Leonard Wartofsky. 1980, 9p

Availability: Pub. in Jnl. of Trauma, v20 n9 p713-721 Sep 80 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A094 649/1 Not available NTIS
Army Inst. of Surgical Research, Fort Sam Houston, TX.
Effect of Injury and Infection on Visceral Metabolism and Circulation,
Douglas W. Wilmore, Cleon W. Goodwin, Louis H. Aulick, Michael C. Powanda, and Arthur D. Mason. 1980, 14p
Presented at Annual Meeting of the American Surgical Association, Atlanta, GA, 23-25 Apr 80.
Availability: Pub. in Annals of Surgery, v192 n4 p491-504 Oct 80 (no copies furnished by DTIC/NTIS).

No abstract available.

AD-A094 655/8 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Naturally Acquired Infections of Klebsiella pneumoniae in Wistar Rats,
N. M. Jackson, H. G. Wall, Charlotte A. Miller, and M. Rogul. 10 Jun 80, 7p

No abstract available.

AD-A094 656/6 PC **A02**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
Evaluation of a Formalin-Inactivated Rift Valley Fever Vaccine in Sheep,
D. G. Harrington, H. W. Lupton, C. L. Crabbs, C. J. Peters, and J. A. Reynolds. 6 Mar 80, 8p
Pub. in the American Jnl. of Veterinary Research, v11 n10 p1559-1564 Oct 80.

No abstract available.

AD-A094 687/1 PC **A05**/MF **A01**
Dwight David Eisenhower Army Medical Center, Fort Gordon, GA. Clinical Investigation Service.
Annual Research Progress Report, Fiscal Year 1980,
Jack A. Horner. 1 Oct 80, 85p

Subject report identifies the research activities conducted by Dwight David Eisenhower Army Medical Center investigators through protocols approved by the Institutional Review Committee for registration with the Department of Clinical Investigation during Fiscal Year 1980, and other known publications and presentations by the Dwight David Eisenhower Army Medical Center professional staff. A detail sheet of each protocol giving the objective, technical approach and progress is presented. (Author)

AD-A094 706/9 PC **A03**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
The Effect of Hyperbaric Oxygen on Certain Growth Features of Four Dermatophytes.
Summary rept.,
William J. Cairney. Dec 80, 43p Rept no. FJSRL-TR-80-005

Four dermatophyte fungi, Trichophyton tonsurans, Trichophyton mentagrophytes, Microsporum gypseum, and Microsporum canis, isolated from human and animal tinea infections, were observed in vitro for macroscopic and microscopic growth characteristics at varying hyperbaric oxygen levels, and for various exposure times and intervals. All organisms were completely inhibited in oxygen at 3 atmospheres absolute. Trichophyton mentagrophytes, Microsporum gypseum, and Microsporum canis were completely inhibited for the duration of exposure to hyperbaric oxygen according to treatment tables routinely used for patients with Clostridial gas gangrene. Trichophyton tonsurans was inhibited only slightly during treatment table exposures. Overall experimental results provide a partial base for use of compression chamber therapy in treatment of tinea infections.

AD-A094 761/4 PC **A03**/MF **A01**
Korea Univ., Seoul. Coll. of Medicine.
Korean Hemorrhagic Fever.
Final rept. 1 Jan-31 Dec 79,
Ho Wang Lee. Mar 80, 49p
Grant DAMD17-79-G-9455

This report presents the results on (1) characterization of KHF virus and (2) transmission of the virus in animal reservoir host, employing the immunofluorescent technique. Physico-chemical properties of the virus are as follows: (a) The virus passed through 100 nm millipore filter buy not 50 nm filter. (b) RNA virus. (c) Deoxycholate, ether, chloroform, acetone, benzene and fluorocarbon inactived the virus. (d) U.V. light inactivated the virus. (e) The virus is lyophilizable. (f) Infectivity of virus is stable at ph 7.0 - 9.0 but inactivated completely at PH 5.0 (g) The virus was relatively stable at 4 deg C but inactivated readily at 37 deg C and (h) Ordinary disinfectants inactivated the virus. Virus transmission in the animal reservoir host are as follows: (a) Apodemus mice were infected by intranasal route. (b) The large amounts of virus was found in saliva and urine but small amounts in feces. (c) Horizontal transmission of the virus among Apodemus occurred beginning 10 days after inoculation of the source cohort, and further groups of animals became infected when caged with Apodemus infected up to 38 days previously. Results were not different when ectoparasitized and clean animals were used in the experiment. (d) Attempts to demonstrate the virus in suspensions of ectoparasites harvested from infected Apodemus were failed.

AD-A094 831/5 PC **A02**/MF **A01**
WESTEC Services, Inc., San Diego, CA.
Remote Medical Diagnosis System (RMDS): Evaluation of the AN/FTA-28 Telephone Terminal Interface.
Final rept. Apr-Jul 78,
W. T. Rasmussen, I. Stevens, and J. West. 1 Dec 80, 21p NOSC-TR-631
Contract N00123-77-D-0458

The mission of the Remote Medical Diagnosis System (RMDS) is to improve medical diagnosis at remote sites. This is accomplished by transmitting medical data and diagnostic information between remote ship or shore sites and full-capability medical centers. The RMDS will enable the medical personnel at a remote site to contact a physician at a diagnostic center (ashore or shipboard) and transmit a visual and auditory presentation of the medical data needed for diagnosis, such as patient history, laboratory tests, ECG tracings, x-ray images, images of a patient injury, heart-lung sounds, and verbal descriptions. By return link, the physician will be able to send diagnosis and treatement information. The communication requirements for this are satisfied by any two-way, voice-grade, narrowband communication channel such as telephone line, hf or uhf radio, or satellite links. The system as a whole consists essentially of the Remote Medical Diagnosis Terminals (RMDTs), user personnel, and existing voice-grade communication links which can be used to interconnect the terminals. All the hardware which is unique to the system is contained in the terminals, including a TV camera, TV monitor, x-ray light box, electronic stethoscope, ECG monitor, audio tape recorder, and audio handsets; and the electronics package, consisting of signal modulator, demodulator, and modems. Shipboard feasibility tests of an early RMDS were completed during FY-75/76.

AD-A094 857/0 PC **A02**/MF **A01**
Oregon Univ. Health Sciences Center, Portland. Dept. of Microbiology and Immunology.
Evidence for the Role of Toxin A in the Pathogenesis of Human Infection with Pseudomonas aeruginosa in Humans,
Alan S. Cross, Jerald C. Sadoff, Barbara H. Iglewski, and Pamela A. Sokol. 24 Mar 80, 11p
Contract DAMD17-78-C-8020, Grant PHS-AI-14671
Pub. in Jnl. of Infectious Diseases, v142 n4 p538-546 Oct 80.

No abstract available.

AD-A094 859/6 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Cytotoxicity to Shigella dysenteriae 1 for Cultured Mammalian Cells,
Thomas L. Hale, and Samuel B. Formal. 1980, 8p
Pub. in The American Jnl. of Clinical Nutrition, v33 p2485-2490 Nov 80.

No abstract available.

AD-A094 861/2 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Elevations of Serum Creatine Phosphokinase in Experimental Mesenteric Infarction,
Geoffrey M. Graeber, Patrick J. Cafferty, Michael J. Reardon, Claudia P. Curley, and John W. Harmon. 1980, 5p
Pub. in American Coll. of Surgeons, Surgical Forum, v31 p148-150 1980.

No abstract available.

AD-A094 862/0 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Nonthrombogenic Character of Vascular Prosthetic Pseudo-Intima,
G. Patrick Clagett, Howard Hufnagel, Rebecca Carter, William Gregory, and Max Robinowitz. 1980, 4p
Pub. in American College of Surgeons, Surgical Forum, v31 p334-336 1980.

No abstract available.

AD-A094 879/4 Not available NTIS
Army Inst. of Surgical Research, Fort Sam Houston, TX.
Bacterial Motility: A Component in Experimental Pseudomonas aeruginosa Burn Wound Sepsis,
A. T. McManus, E. E. Moody, and A. D. Mason. 19 Mar 79, 5p
Availability: Pub. in Burns, v6 n4 p235-239 1979 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A094 916/4 PC **A02**/MF **A01**
Institute for Medical Research, Kuala Lumpur (Malaysia).
Antigenic Classification of Rickettsia tsutsugamushi Isolates from Small Mammals Trapped in Developing Oil Palm Complex in Peninsular Malaysia,
Akira Shirai, Alexander L. Dohany, Elsie Gan, Teik Chye Chan, and David L. Huxsoll. 7 Mar 80, 6p
Pub. in Japanese Jnl. of Medical Science and Biology, v33 n4 p231-234 Aug 80.

No abstract available.

AD-A094 998/2 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Plasma Adenine and Cellular ATP in Red Cell Concentrates Collected and Stored in Modified CPD at 4 C.
Final rept. Jan-Feb 79,
G. L. Moore, M. E. Ledford, and D. E. Brooks. 21 Nov 77, 6p Rept no. LAIR-79-039
Pub. in Transfusion, v19 n1 p68-71 Jan-Feb 79.

No abstract available.

AD-A094 999/0 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Clinical Nutrition is a Medical Specialty.
Final rept.,
Robert H. Herman, and Louis Hagler. 1978, 4p Rept no. LAIR-79-040
Pub. in The Western Jnl. of Medicine, v130 p93-94 Feb 79.

No abstract available.

AD-A095 001/4 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Uneven Distribution of Aerobic Mesophilic Bacteria on Human Skin.
Final rept.,
William A. Keith, Roko J. Smiljanic, William A. Akers, and Lonnie W. Keith. 30 Oct 78, 4p Rept no. LAIR-79-042
Pub. in Applied and Environmental Microbiology, v37 n2 p345-347 Feb 79.

No abstract available.

AD-A095 003/0 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Work-Induced Muscle Hypertrophy in Vitamin D-Deficient Rats.
Final rept.,
Daniel D. Bikle, Louis Hagler, Lance O. Lollini, Sam F. Hull, and Robert H. Herman. 1978, 3p
Rept no. LAIR-79-047
Pub. in the American Jnl. of Clinical Nutrition, v32 p515-516 Mar 79.

No abstract available.

AD-A095 005/5 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Interactions of Trichophyton Mentagrophytes and Micrococci on Skin Culture.
Final rept.,
D. Jan Bibel, and R. J. Smiljanic. 26 Jun 78, 8p
Rept no. LAIR-79-049
Pub. in Jnl. of Investigative Dermatology, v72 p133-137 1979.

No abstract available.

AD-A095 027/9 PC **A02**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
The Effect of Hyperbaric Oxygen on the Growth of Rhizopus nigricans.
Summary rept.,
William J. Cairney, and Karen A. O'Hair. Dec 80, 21p Rept no. FJSRL-TR-80-006

Plus (+) and minus (-) mating strains of Rhizopus nigricans were observed in vitro for macroscopic and microscopic growth characteristics at varying hyperbaric oxygen levels and for various exposure times and intervals. Definite inhibition of both strains was observed within oxygen levels well tolerated by humans. Overall experimental results provide in vitro basis for use of compression chamber therapy in treatment of mucormycosis caused by Rhizopus nigricans. (Author)

AD-A095 046/9 PC **A02**/MF **A01**
Biomedical Research Inst., Rockville, MD.
Penetration Enzymes of Schistosome Cercariae.
Annual rept. no. 5, 31 Dec 80-1 Jan 81,
M. A. Stirewalt, and F. A. Lewis. 1 Jan 81, 21p
Contract N00014-76-C-0053

Cercarial production and rates of snail infection and death were similar from exposures of 8-10, 6-8 or 5 miracidia per snail. 5-miracidium exposures were most efficient. Snails limit number of primary sporocysts which develop regardless of number of miracidia. Different combinations of intraspecific geographical strains of S. mansoni and Biomphalaria glabrata varied in capability for cercarial production. Vaccination potentials were similar. Artificially transformed schistosomules lagged 48 to 96 hr behind in vivo in morphological and physiological changes. (Author)

AD-A095 059/2 PC **A02**/MF **A01**
Boston Univ., MA. School of Medicine.
Relation of Cell Wall to the Virulence of Shigella flexneri.
Final rept. 1 Jul 68-29 Feb 76,
Laurence M. Corwin. 9 Feb 76, 21p
Contract DADA17-68-C-8146

Most of the work has been devoted to trying to understand why the avirulent mutant of Shigella flexneri 2a (24570), which is antigenically identical to its virulent parent (M-42-43) is nevertheless unable to penetrate the intestinal epithelium. It was found that the strains were different in several characteristics of the cell wall. First, the 24570 was much more resistant to sodium lauryl sulfate, an anionic detergent, than the virulent strain, M4243. It has also been shown that the avirulent strain is four times as electronegative, but this was dependent on the presence of calcium ions. Apparently the electronegativity has made the avirulent strain resistant to other agents such as EDTA and lysozyme. Other studies have shown that the avirulent mutant is deficient in the enzyme, glycerol kinase. This enzyme has shown to be genetically linked to the expression of electronegativity. It was thought that in Shigella, a cell wall mutation may be affecting the expression of glycerol kinase, hence the relation of electronegativity. This was given more credence when it was demonstrated that the uptake of Krebs cycle acids was severely curtailed. Finally, work was begun to indicate that fluorescent probes may be useful to detect differences between virulent and avirulent strains of Shigella.

AD-A095 069/1 PC **A05**/MF **A01**
Connecticut Univ. Health Center, Farmington.
The Effect of a Low Fluoride Delivery System on Bacterial Metabolism.
Annual rept. 1 Sep 79-30 Sep 80,
Norman Tinanoff, and David Camosci. Sep 80, 94p
Contract DAMD17-78-C-8066

This contract dealt with the incorporation and slow release of various fluoride compounds in temporary restorative materials to impart antiplaque and anticaries activity to the restorative material. In the first phase of the study we examined the effect of various fluoride compounds on bacterial growth, metabolism and attachment. We found that 10 ppm F(-), a concentration that is compatible with a slow release agent, as well below bacterial growth inhibition or bactericidal levels. However, all fluoride compounds at this concentration produced decreased acid production of plaque forming organisms. As well, Na2SnF6, NaF and SnF2 appeared to affect the attachment mechanisms of S. mutans to enamel, with SnF2 being the most effective. An increase in both alkali and water soluble glucans of the bacteria suggest that fluoride at low levels produces unbalanced growth. The large accumulation of tin found in those organisms treated wtih SnF2 may account for the increased effectiveness of SnF2. From this series of experiments, it appears that continuous exposure of SnF2 (10 ppm F(-)) has the most effect on S. mutans growth, metabolism and attachment.

AD-A095 115/2 PC **A09**/MF **A01**
Armed Forces Radiobiology Research Inst., Bethesda, MD.
Proceedings of Invitational Symposium on the Serodiagnosis of Cancer (1st).
Special publication.
Mar 74, 186p Rept no. AFRRI-SP74-1

The reports incorporated in the Proceedings were presented at the Symposium. They were divided into three major categories: (1) Enzymes in the serodiagnosis of cancer, (2) Unique antigenic systems in the serodiagnosis of cancer, and (3) Glycoprotein correlations in the serodiagnosis of cancer. (Author)

AD-A095 128/5 PC **A04**/MF **A01**
Directorate General of Army Health Services, Canberra (Australia).
Proceedings of the Meeting of Australian Research Workers on Malaria (1st) Held at Ingleburn, 22-24 February 1980.
1980, 58p Rept no. DGAHS-158/80

Partial Contents: Summary of the Discussions on Selected Subjects of Research on Malaria--diagnosis of Malaria, Epidemiology and Control of Malaria, Pathology and Clinical Aspects of Malaria, Malaria Prophylaxis and Treatment; Venue of Future Meetings of Australian Research Workers on Malaria.

AD-A095 135/0 PC **A02**/MF **A01**
Peter Bent Brigham Hospital, Boston, MA.
Safety and Immunogenicity Testing of a Pilot Polysaccharide Vaccine Preparation to Pseudomonas aeruginosa.
Annual rept. 1 Mar-15 Aug 79,
Gerald B. Pier. Sep 79, 17p
Contract DAMD17-79-C-9050

Purification techniques were developed for obtaining a high molecular weight polysaccharide preparation for testing as a vaccine to infections caused by the bacterium Pseudomonas aeruginosa. A pilot preparation from an immunotype 7 strain of this organism was made after consideration of using anion exchange resins and colonial morphology criteria for selecting techniques used for purification. Serological assays in the form of a radioactive antigen binding assay and a splenic plaque forming cell assay were developed to assay the polysaccharide preparations for immunogenicity. Finally testing of the polysaccharide preparations in animal models of P. aeruginosa infection have commenced. (Author)

AD-A095 154/1 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Experimental Studies of Acute Anterior Cruciate Ligament Injury and Repair.
Final rept.,
H. Edward Cabaud, William G. Rodkey, and John A. Feagin. 1979, 7p Rept no. LAIR-79-038
Pub. in American Jnl. of Sports Medicine, v7 n1 p18-22 1979. Presented at the Annual Meeting of the American Orthopaedic Society for Sports Medicine, Lake Placid, NY, 30 Jun-4 Jul 78.

No abstract available.

AD-A095 155/8 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Morphologic Effects Following Massive Exchange Transfusions with a Stroma-Free Hemoglobin Solution. II. Kidney.
Final rept.,
Harold Friedman, Frank DeVenuto, Lance Lollini, Paul Mellick, and Thomas F. Zuck. 24 Jan 79, 15p Rept no. LAIR-79-062
Pub. in Laboratory Investigation, v40 n6 p655-667 1979. See also AD-A073 256.

No abstract available.

CEA-CONF-4740 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Service de Chimie-Physique.
Use of Quantimet 720 for Quantitative Analysis of Acute Leukemia Images in Animals and Humans.
E. Feinermann, and G. A. Langlet. 1979, 2p
CONF-790812-4
International conference on medical physics, Jerusalem, Israel, 19 Aug 1979.
U.S. Sales Only.

Considerable progress has been achieved in the past ten years in the analysis of particle size and form. Automatic and quantitative image analyzers and stereology enabled a comparative study of acute human and animal leukemias. It is obvious that the agreement of results between these two natural and induced categories provides encouragement to continue this investigation by these methods. (Atomindex citation 11:525974)

CEA-CONF-4807 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Recherche et Analyse.
Current Lung Water Measurement Methods in Man.
G. Basset, F. Moreau, J. Marsac, R. Capitini, and F. Botter. 1979, 7p CONF-7909172-1
In French.Session on reanimation, Paris, France, 26 Sep 1979.
U.S. Sales Only.

Two kinds of tracer method are used to estimate the lung water pools differing by the tracer intake and the sector observed. Airborne intake gives an estimate of the tissues irrigated by the lung and bronchial circulation, whereas vascular intake only shows the sectors perfused by the lung flow. Either of these methods is suitable for a general or regional analysis. In general methods the tracer is followed at the lung exit on expired air for the first method, on peripheral arterial blood for the second. Regional methods imply partial or whole-lung external detection systems. (Atomindex citation 11:546687)

COO-4268-7(80) PC **A06**/MF **A01**
Sloan-Kettering Inst. for Cancer Research, New York.
Biomedical Research with Cyclotron Produced Radionuclides. Progress Report, January 1, 1979-June 30, 1980.
J. S. Laughlin, R. S. Benua, and A. S. Gelbard. Sep 80, 119p
Contract AS02-77EV04268

Separate abstracts were prepared for the 24 papers presented in this progress report dealing

with the use of radionuclides produced by the cyclotron. (ERA citation 06:006612)

DOE/EV/10270-1 PC **A02**/MF **A01**
Washington Univ., Seattle. Dept. of Biological Structure.
Marrow-Tumor Interactions: The Role of the Bone Marrow in Controlling Chemically Induced Tumors.
C. Rosse. 1980, 5p
Contract AT06-79EV10270

This report summarizes work done to evaluate the role of the bone marrow in tumor growth regulation. Work done with the MCA tumor showed that several subclasses of mononuclear bone marrow cells (e.g. natural regulatory cell, NRC) play a major role in the regulation of tumor growth. Experiments with the spontaneous CE mammary carcinoma system illustrate that a rapid growth of certain neoplasms may be due to the fact that through some as yet undefined mechanism the tumor eliminates mononuclear cells in the bone marrow of the host and stops their production. (ERA citation 06:008273)

DOE/EV/10359-1 PC **A03**/MF **A01**
Franklin McLean Memorial Research Inst., Chicago, IL.
Nuclear Medicine and Imaging Research. Progress Report, January 1, 1980-December 31, 1980.
R. N. Beck, and M. C. Cooper. Sep 80, 34p
Contract AC02-80EV10359

Separate abstracts were prepared for the 5 subprojects designated as projects 1 to 4 and 6 in this progress report. (ERA citation 06:008203)

HRP-0902688/1 PC **A05**/MF **A01**
Strategy Council on Drug Abuse, Washington, DC.
Federal Strategy for Drug Abuse and Drug Traffic Prevention 1979.
1979, 78p

The Strategy 1979, sets two realistic policy objectives: first, to discourage all drug abuse--including the abuse of alcohol; and second, to reduce to a minimum the health and social consequences (such as deaths, injuries, crime, broken families and deteriorating neighborhoods) of drug abuse when it does occur. Strategy 1979 reflects a three-part program to reduce the negative effects of drug abuse: (1) treatment, rehabilitation and prevention; (2) domestic drug law enforcement; and (3) international narcotics control. The overall program is intended to provide balanced and flexible means to reduce the supply of illicit drugs, discourage use, and make treatment available to drug abuse victims.

HRP-0902692/3 PC **A02**/MF **A01**
Institute for Health Planning, Inc., Madison, WI.
Exemptions and Required Recommendations Under Certificate of Need.
1981, 16p
Contract PHS-HRA-232-79-0036

Enactment of certificate of need laws intended to control capital expenditures by health care institutions has been required by Federal statute since 1975. Public Law 93-641, the National Health Planning and Resources Development Act, instituted a requirement that states enact such legislation or lose certain Federal financial support. Public Law 96-79, the 1979 Health Planning Amendments, strengthened the penalities for failure to enact such laws. States have been also given specific time deadlines within which to enact certificate of need or lose Federal support on a graduated scale over three years.

HRP-0902705/3 PC **A05**/MF **A01**
American Dental Association, Chicago, IL.
Strategies for Dental Society Participation in Shortage Area Designations and National Health Service Corps Assignments.
Jan 80, 91p

The processes of identifying and designating Dental Health Manpower Shortage Areas and of assigning National Health Service Corps Personnel are explored. State and local dental societies are encouraged to take the initiative in identifying areas with shortages of dental manpower and in developing strategies for alleviating those shortages. The federal criteria for designation of dental shortage areas are detailed and the difficulties in applying the criteria are discussed, including difficulties in identifying rational service areas and contiguous areas, differences between urban and rural shortage areas, and problems of measuring socioeconomic access barriers. The political factors affecting designation decisions are discussed and the importance of Health Systems Agencies in both HMSA designations and NHSC placements is emphasized. Alternative strategies for alleviating shortages are explored. State and local dental societies are urged to undertake private efforts to deal with shortages before seeking HMSA designations and NHSC placements. These private measures include reallocation of existing local resources, elimination of access barriers, and recruitment of new dentists through either the ADA's National Health Professions Placement Network or through direct recruitment from dental schools. The process of applying for NHSC personnel is detailed and the responsibilities of the sponsoring agency are discussed. Factors influencing NHSC placement decisions are evaluated, including NHSC policies and objectives and problems of recruiting personnel. An appendix discusses various sources for the data needed in both the designation and placement processes.

HRP-0902706/1 PC **A03**/MF **A01**
Nebraska State Dept. of Health, Lincoln. Div. of Health Data and Statistical Research.
Nebraska Health Manpower Reports: Nebraska Veterinarians 1978.
1978, 41p

The data contained in this report were collected by questionnaires mailed to each Veterinarian licensed by the State of Nebraska as of May 1, 1978. The total number of licensed Veterinarians on this date was 815, of whom 455 were either practicing in Nebraska or retired and residing in Nebraska. These 455 Veterinarians - and, more specifically, the 420 who were in active practice in Nebraska on the above date - constitute the statistical population for the major portion of this report. Annual surveys of fourteen licensed health professions are conducted by the Division of Health Data and Statistical Research of the State Department of Health, in order that timely and reliable data concerning the supply, distribution, and characteristics of health manpower in Nebraska may be made available at the State and local levels. In addition, information from these surveys is forwarded to the National Center for Health Statistics for inclusion in the Cooperative Health Statistics System at the national level.

HRP-0902707/9 PC **A02**/MF **A01**
Nebraska State Dept. of Health, Lincoln. Div. of Health Data and Statistical Research.
Nebraska Health Manpower Reports: Physician's Assistants 1978.
1978, 14p
See also HRP-0025984.

The data contained in this report were collected by questionnaires mailed to each Physician's Assistant certified by the State of Nebraska as of November 1, 1978. The total number of certified Physician's Assistants on this date was 49, all of whom were practicing in Nebraska. Annual surveys of fourteen licensed health professions are conducted by the Division of Health Data and Statistical Research, in order that timely, reliable, and comparable data concerning the supply, distribution, and selected characteristics of health manpower in Nebraska may be made available at the State and local levels. In addition, information derived from these surveys is forwarded to the National Center for Health Statistics for inclusion in the Cooperative Health Statistics System at the national level.

HRP-0902708/7 PC **A02**/MF **A01**
Nebraska State Dept. of Health, Lincoln. Div. of Health Data and Statistical Research.
Nebraska Health Manpower Reports: Manpower Summary 1978.
1978, 16p

During the past year, statistics detailing the number, location and practice characteristics of licensed practitioners in fifteen health professions have been collected and several reports in the Nebraska Health Manpower Reports series have been released. These reports are compiled by the Division of Health Data and Statistical Research of the State Department of Health, and derive their data from questionnaires which accompany license renewal or application forms.

HRP-0902711/1 PC **A05**/MF **A01**
Southeastern Wisconsin Health Systems Agency, Inc., Milwaukee.
CT (Computer Tomography) Services in Southeastern Wisconsin Policies and Standards.
17 Jan 80, 97p
Grant PHS-05-P-000211-04

This report was developed by the Ad Hoc CT Scanner Study Committee which was established by the Southeastern Wisconsin Health Systems Agency (SEWHSA) Executive Committee in June of 1979. The Study Committee was charged with the responsibility to develop recommendations on the appropriate number and location of CT scanners in the region. The Study Committee reviewed the suitability of local, state, and national guidelines and standards relating the CT services. It was cognizant of SEWHSA's responsibility to develop plans which take into consideration the National Guidelines for Health Planning published by the Department of Health, Education and Welfare (DHEW) in March, 1978.

HRP-0902712/9 PC **A06**/MF **A01**
Southeastern Wisconsin Health Systems Agency, Inc., Milwaukee.
Policies and Procedures for Development of the Health Systems Plan and Annual Implementation Plan for Southeastern Wisconsin (Including Appropriateness Review).
18 Sep 80, 104p
Grant PHS-05-P-000211-04
See also HRP-0029931.

The development and revision of the Health Systems Plan (HSP) and Annual Implementation Plan (AIP) for southeastern Wisconsin is the most encompassing and apparent sign of the effort of the Southeastern Wisconsin Health Systems Agency (SEWHSA) to provide effective health planning for the citizens of its health service area. This document, Policies and Procedures for Development of the Health Systems Plan and Annual Implementation Plan for Southeastern Wisconsin, describes SEWHSA's planning responsibilities and the process by which they are carried out. The legislative mandate for planning is reviewed in the document, but more importantly, SEWHSA's operational interpretation of the planning process is outlined. By clarifying its policies and procedures for HSP and AIP development, SEWHSA improves its accountability to the community. Therefore, Policies and Procedures is not only a guide for subsequent planning activities, it also legitimizes the products of the planning activities because they result from a consistent, well-defined, publicly-approved planning process.

HRP-0902713/7 PC **A02**/MF **A01**
Health Care Financing Administration, Baltimore, MD. Office of Research, Demonstrations, and Statistics.
Medicare: Participating Health Facilities, 1979,
Wayne Callahan. 1979, 17p DHHS/PUB/HCFA-79/03060

This report presents 1979 data on the number and geographic location of providers and suppliers of health services under Medicare, based on records maintained by the Health Care Financing Administration (HCFA). Every provider and supplier of health services must apply for participation in the Medicare program. Data from the application forms are stored in the central provider record and are updated as facilities are recertified, as new ones apply for participation, or as some leave the program. When the information in the provider file is combined with utilization data, it relates the characteristics of facilities that provide health care to the kinds and amounts of services used by persons insured under Medicare.

HRP-0902715/2 PC **A02**/MF **A01**
Health Care Financing Administration, Baltimore, MD. Office of Research, Demonstrations, and Statistics.
Medicare: Use of Hospital Outpatient Services, 1974-1978,
Martin Ruther. 1980, 13p DHHS/PUB/HCFA-80/03058

This Note presents preliminary data on the use of hospital outpatient services by Medicare beneficiaries in 1978. It is the second in a series presenting hospital outpatient data from the Medicare program. Diagnostic and therapeutic hospital outpatient services are covered under the supplementary medical insurance (SMI) program. Diagnostic services are examinations or tests for assessing medical conditions or for identifying diseases. These include the services of nurses, psychologists, and technicians; drugs needed for diagnosis; and the use of supplies and equipment. Therapeutic services are those that aid physicians in treating patients and must pertain to physicians' services. Services include the use of hospital facilities such as clinic and emergency rooms, the services of various hospital personnel, speech and physical therapy services, and medical supplies and medical devices. Excluded are charges by physicians except in cases where they elect to have hospitals do their billing for them.

HRP-0902718/6 PC **A03**/MF **A01**
Health Systems Agency of Summit-Portage County, Akron, OH.
Annual Implementation Plan for 1980. Health Service Area 8 Ohio.
1980, 44p
Grant PHS-05-P-000223-04-1
See also HRP-0902719.

AIP objectives should endeavor to fulfill those aspects of the HSP long-range goals and objectives which can be implemented within a year of its establishment. The AIP identifies the specific priority short-range objectives upon which the community wishes to act during the ensuing year and the short-range actions the community intends to take to achieve those objectives.

HRP-0902719/4 PC **A24**/MF **A01**
Health Systems Agency of Summit-Portage County, Akron, OH.
Health Systems Plan for 1980-1985. Health Service Area 8 Ohio. 3rd Edition.
1980, 555p
Grant PHS-OP-50002-23-04-2
See also HRP-0901910 and HRP-0902718.

The purposes of the HSA are as follows: (a) Improving the health of residents of a health service area; (b) Increasing the accessibility (including overcoming geographic, economic, architectural, cultural, and transportation barriers), acceptability, continuity, and quality of health services provided; (c) Restraining increases in the cost of providing health services; and (d) Preventing unnecessary duplication of health resources.

HRP-0902724/4 PC **A04**/MF **A01**
Comprehensive Health Planning Council of Southeastern Michigan, Inc., Detroit.
Technical Assistance Manual for the Consolidation of Two or More Hospitals.
1980, 59p
Grant PHS-05-P-000235-04

The Michigan Public Health Code (Public Act 368) enacted by the Michigan State Legislature in 1978 contains provisions which mandate the reduction of acute care hospital capacity in those health facility service areas which have excess capacity as determined by the state. The law requires that hospital capacity reduction plans be developed and that technical assistance be provided in the implementation of these plans by health systems agencies (CHPC-SEM) or, if they fail to do so, the state (Office of Health and Medical Affairs/Statewide Health Coordinating Council) develops such plans. Capacity reduction plans developed by health systems agencies must be approved by the Statewide Health Coordinating Council (SHCC). These plans are to encompass a five-year planning horizon; the law requires an evaluation of the plan's effectiveness not later than three and one-half years after initial plan approval.

HRP-0902725/1 PC **A22**/MF **A01**
Michigan Mid-South Health Systems Agency, Inc., Mason.
Health System Plan for 1980. Health Service Area 2 Michigan. 3rd Edition.
1980, 504p
Grant PHS-05-P-00023-10-40
See also HRP-0901196 and HRP-0902726.

The summary provides a complete listing of the goals, objectives, and recommended actions contained in the Michigan Mid-South Health Systems Agency's Health Systems Plan for 1979 to 1984. MMSHSA annually develops a health systems plan (HSP) which is a statement of the desired health condition of area residents and the desired characteristics of the health care services within the area. The HSP is a community document. It is prepared with broad community participation and is an excellent vehicle for public opinions, concerns, and desires. The HSP is implemented through preparation and implementation of a one-year plan called an Annual Implementation Plan (AIP). The AIP is based upon the HSP's recommended actions and seeks to achieve them.

HRP-0902726/9 PC **A04**/MF **A01**
Michigan Mid-South Health Systems Agency, Inc., Mason.
Annual Implementation Plan for 1980. Health Service Area 2 Michigan.
1980, 66p
Grant PHS-05-P-00023-10-40
See also HRP-0901195 and HRP-0902725.

The summary provides a complete listing of the short-range objectives and actions contained in the Michigan Mid-South Health Systems Agency's Annual Implementation Plan for 1980-81.

HRP-0902727/7 PC **A20**/MF **A01**
Western Wisconsin Health Systems Agency, Inc., La Crosse.
Health Systems Plan and Annual Implementation Plan for 1980. Health Service Area 5 Wisconsin. 3rd Edition.
1980, 475p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD. See also HRP-0901662.

The HSP provides a framework which promotes a healthful environment, enables the review of proposed health system changes, facilitates the reduction of documented deficiencies and inefficiencies within the area, and facilitates desired achievements which meet identified needs of the community.

HRP-0902728/5 PC **A17**/MF **A01**
Northeast Texas Health Systems Agency, Inc., Marshall.
Health Systems Plan and Annual Implementation Plan for 1980. Health Service Area 7 Texas. 3rd Edition.
1 Apr 80, 398p
Contract PHS-06-P-000208-04
See also HRP-0901583 and HRP-0902729.

This comprehensive plan addresses the aspects of prevention, education, diagnosis, treatment, maintenance, rehabilitation, manpower, facilities and services relative to major health problems and health concerns of the area. The HSP is a joint effort of providers and consumers and, as such, is utilized by many health services and funding organizations as well as governmental agencies as a framework for developing, delivering and expanding health care. It also provides the basis for the Project Review and the future Appropriateness Review functions of the agency. The Annual Implementation Plan (AIP) is derived from the HSP. The Task Forces prioritize the goals of the HSP with the high priority goals being the core of the AIP.

HRP-0902729/3 PC **A07**/MF **A01**
Northeast Texas Health Systems Agency, Inc., Marshall.
Health System Plan for 1980. Health Service Area 7 Texas. Appendix.
1980, 148p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD. See also HRP-0901035 and HRP-0902728.

The appendix to the main report contains legislation, committee members, agenda of meetings, and summaries of statistical data.

HRP-0902732/7 PC **A05**/MF **A01**
Mid-Ohio Health Planning Federation, Columbus.
Annual Implementation Plan for 1980. Health Service Area 5 Ohio.
1980, 87p
Grant PHS-05-P-000218-04-2
See also HRP-0901667, and HRP-0902733.

The Annual Implementation Plan identifies the activities to be implemented within the next year, which will contribute to the achievement of the high priority goals and objectives identified in the Mid-Ohio Health Planning Federation's 1980 Health Systems Plan. For each AIP objective selected, recommended actions and resource requirements are identified.

HRP-0902733/5 PC **A21**/MF **A01**
Mid-Ohio Health Planning Federation, Columbus.
Health Systems Plan for 1980. Health Service Area 5 Ohio. 3rd Edition.
1980, 486p
Grant PHS-05-P-000218-04-2
See also HRP-0902732.

The Health Systems Plan (HSP) is the Health Systems Agency's articulation of desired achievements for improvement in the health status of area residents and in the health systems serving that population. The purpose of the HSP is to promote at the local level, comprehensive health systems which will assure a healthful environment and the availability and accessibility of high quality health services in a manner which assures continuity of care at a reasonable cost for all residents of the area.

HRP-0902734/3 PC **A03**/MF **A01**
South Plains Health Systems, Inc., Lubbock, TX.
Annual Implementation Plan for 1980. Health Service Area 2 Texas.
1980, 37p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD. See also HRP-0902735.

The AIP identifies the specific priority short-range objectives upon which the community wishes to act during the next year. The AIP identifies the specific actions the community proposes to take as well as the effects of such actions in order to accomplish the identified objectives. In brief the AIP makes explicit the means to achieve the objectives described in the Health Systems Plan.

HRP-0902735/0 PC **A14**/MF **A01**
South Plains Health Systems, Inc., Lubbock, TX.
Health Systems Plan for 1980. Health Service Area 2 Texas. 2nd Edition.
1980, 314p
See also HRP-0901643, and HRP-0902734. Sponsored in part by Bureau of Health Planning, Hyattsville, MD.

The 1980 HSP/AIP represents the third edition of the set of plans and the revision process followed this year represents the second attempt to revise the HSP/AIP. It has been the goal of the Advisory Group and staff to maintain the philosophy and intent expressed in last year's plans whenever possible. New information and some areas not addressed in last year's plan have been utilized in developing the 1980 document. Many of the steps followed in the development of the first set of plans have been repeated in the revision process and are discussed briefly in the following paragraphs. In addition to local expert opinion and community perceptions, various other types of information were collected and analyzed in a manner designed to contribute to the understanding of the status of the health of area residents, their utilization of the health care delivery system, its status and its effect on the health of area residents. Also, environmental and occupational health factors were analyzed with respect to impact on the health of area residents and for appropriateness of inclusion in the HSP/AIP.

HRP-0902736/8 PC **A06**/MF **A01**
Orange County Health Planning Council, Tustin, CA.

Directions in Health Services to Ethnic Minorities and Persons with Low Incomes.
c1978, 118p
Grant PHS-09-P-000998-03

The Orange County Health Planning Council (OCHPC), Board of Directors chartered the Health Problems of Special Population Groups Committee in January 1977. Among other responsibilities, the Health Problems of Special Population Groups Committee was assigned responsibility for completing a directions report which would address the health needs of ethnic minorities and low-income residents of Orange County. The report contains OCHPC's preliminary findings relative to the health status of ethnic minorities and persons with low incomes in Orange County and an initial assessment of how the health care delivery system responds to their needs. Strategies to improve health status of ethnic minorities and low-income persons and to increase the effectiveness of the health care delivery system are also included in this report.

HRP-0902737/6 PC **A06**/MF **A01**
Orange County Health Planning Council, Tustin, CA.
Directions in Health Promotion Services and Programs, 1979-1985.
c1979, 102p
Grant PHS-09-000998-03

As in other communities throughout America, Orange County residents have tended to believe that health could be improved through an ever increasingly sophisticated and expensive medical care delivery system. This widespread belief exists despite studies which indicate that health is not primarily attributed to variations in the quantity or quality of medical care, but rather to the effects of lifestyle habits. The Orange County Health Planning Council (OCHPC) created the Health Promotion Planning Task Force to produce a component of the Health Systems Plan concerned with improving the health of Orange County residents, rather than maintaining their health or diagnosing and treating their illnesses. This document, Directions in Health Promotion Services and Programs, presents (1) a considerable body of evidence linking lifestyle to health; (2) an analysis of health promotion services and programs in Orange County, and (3) short and long-range objectives and actions aimed at improving the health status of Orange County residents. As such, this document will be useful to decisionmakers, community leaders, and other residents throughout Orange County who are interested in promoting wellness.

HRP-0902739/2 PC **A03**/MF **A01**
South Texas Health Systems Agency, Kingsville.
Annual Implementation Plan for 1980. Health Service Area 8 Texas.
1980, 47p TX-08-80-18
Grant PHS-06-P-000211-04
See also HRP-0902740.

The Annual Implementation Plan (AIP) of the South Texas Health Systems Agency identifies recommended actions to be accomplished within one year either to achieve or as a step in achieving the Health Systems Plan's (HSP) goals and objectives. The long-range goals and objectives set forth in the HSP provide the foundation for the development of the short-range priority objectives of the AIP. The HSP can be used by area residents and health community as a guide to how the health system should change over a five-year period. The AIP identifies the specific priorities and short-range objectives which should be acted upon during the ensuing year. The AIP objectives are related to those in the HSP which warrant immediate HSA and community action.

HRP-0902740/0 PC **A13**/MF **A01**
South Texas Health Systems Agency, Kingsville.
Health Systems Plan for 1980-1984. Health Service Area 8 Texas. 3rd Edition.
Apr 80, 295p TX-08-80-17
Grant PHS-06-P-000211-04
See also HRP-0901834, and HRP-0902739.

The STHSA's Health Systems Plan is a statement of the desired improvement needed in the South Texas Health System to attain a higher level of health status. The purpose of the HSP is to promote comprehensive health systems which improve levels of health status, assure healthful environments and provide for high quality health services in a manner that fosters continuity of care at a reasonable cost for all South Texas residents. The long-range goals and objectives set forth in the HSP will provide the foundation for the development of the short-range priority objectives of the AIP. The HSP can be used by area residents and the health community as a guide to how the health system should change over a five-year period.

HRP-0902741/8 PC **A17**/MF **A01**
Panhandle Health Systems Agency, Amarillo, TX.
Health Systems Plan and Annual Implementation Plan for 1980. Health Service Area 1 Texas.
Apr 80, 397p
Grants PHS-06-P-000199-01, PHS-06-P-000199-02
See also HRP-0901010.

The Health Systems Plan is a detailed statement of goals describing desired levels of health status, a healthful environment, and health systems in Region 1. The Health Systems Plan is based on an analysis of the health needs of the population in the health service area, the health services delivered and health resources available, and on a study of alternative settings in which health services can best be provided. The population-based plan is devoted to directing health changes of a specific and desired nature. An indepth analysis of the available health resources and anticipation of health needs will result in the development of goals and objectives directed at improving the health status of the population.

HRP-0902742/6 PC **A05**/MF **A01**
Orange County Health Planning Council, Tustin, CA.
Current Directions in Health and Supportive Services in the Home.
c1978, 86p
Grant PHS-09-P-000998-02-0

Home health services may be defined as a complex of medical, health and health-related services brought into the home, singly or in combination, for the purpose of promoting, maintaining or restoring health, activity and independence for individuals of all ages. A broad range of prevention and detection, diagnosis and treatment, habilitation and rehabilitation, and maintenance services can be delivered in the home setting. Increasingly, these services are being recognized as an important, integral component of any comprehensive and effective health/medical care delivery system. They not only can form a major interface between institutionalization and self-care, but aiso can serve as an important primary care alternative to institutionalization in many cases.

HRP-0902744/2 PC **A14**/MF **A01**
National Board of Medical Examiners, Philadelphia, PA.
Strategies for the Evaluation of Competence of Physicians Who Assume Responsibilities for Patient Care in Graduate Medical Education. Volume I.
Rept. for 1 Jul 76-31 Dec 79,
Edithe J. Levit. 1980, 323p
Contract PHS-HRA-231-76-0067
See also Volume 2, HRP-0902745.Portions of this document are not fully legible.

The report describes the results of a contract to the National Board of Medical Examiners from DHEW's Health Resources Administration for the purpose of developing a comprehensive method of assessing the readiness of medical students to assume patient care responsibilities during graduate medical education. This NBME activity is known as the Comprehensive Qualifying Evaluation Program.

HRP-0902745/9 PC **A19**/MF **A01**
National Board of Medical Examiners, Philadelphia, PA.
Strategies for the Evaluation of Competence of Physicians Who Assume Responsibilities for Patient Care in Graduate Medical Education. Volume II.
Rept. for 1 Jul 76-31 Dec 79,
Edithe J. Levit. 1980, 448p
Contract PHS-HRA-231-76-0067
See also Volume 1, HRP-0902744.Portions of this document are not fully legible.

The study focused on three evaluation techniques. The first concerned direct observation of interviewing behavior. Particular emphasis was given to the use of an interaction analysis technique called Interaction System for Interview Evaluation (ISIE) and to the measurement of certain short-term interview outcomes. The second technique was a non-video paper-and-pencil examination which assessed primarily the subject's ability to decide what should be said to a patient. The third technique was presented to the examinees by means of videotape; here, examinees were asked to make certain judgments about brief vignettes of physician-patient interaction which appeared on the video screen.

HRP-0902748/3 PC **A02**/MF **A01**
Western Center for Health Planning, San Francisco, CA.
Issues in Planning for Hospice Services: An Introduction,
Lucy Johns. 1980, 14p TECHNICAL ASSISTANCE MEMO-76
Contract PHS-HRA-232-79-0037

Since hospices are primarily funded out of voluntary resources, these organizations have not attracted much attention from HSA planners. A planner interested in developing plans for hospice care will discover that several of its basic features inhibit use of common planning tools. Observations are presented to guide questioning and data-seeking at the local level. Addressed in particular is the utility of standards and methods used in the Metropolitan Health Planning Council's (Cleveland-area HSA) Plan for a Hospice System of Care.

HRP-0902749/1 PC **A03**/MF **A01**
Alpha Center for Health Planning, Bethesda, MD.
Political Action in Health Planning: Building a Consumer Constituency,
Claire Lipschultz. Nov 80, 37p
Contract PHS-HRA-232-79-0035

The health planning program operates in a political environment. The various political forces which impinge on the program will determine the ability of planning agencies to successfully develop and implement health plans for the community. In an effort to accomplish the objectives of the planning program, agencies must develop appropriate strategies for dealing with these political forces. There are a variety of political actions which agencies can undertake to carry out their mandated mission. However, the scope of this document will be limited to the examination of one type of political action. It will focus on the development of a strong and effective consumer constituency for health planning both inside the agency and in the community it serves. It is intended to demonstrate how an organized and knowledgeable consumer voice is essential to participatory and responsive health planning.

HRP-0902752/5 PC **A04**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
HSA and SHPDA Activities in Cost Containment - Interim Report. Report of Telephone Survey for Performance Evaluation Program Study of Cost Containment.
Oct 80, 56p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD. See also HRP-0902753.

This report presents the results of a telephone survey of 25 HSAs and 13 SHPDAs concerning their activities in cost containment. The survey was designed to provide the Bureau of Health Planning with information on overall performance of the health planning network in this area, as a guide to Bureau policy-making and technical assistance activity, and to help identify individual agencies with programs that might provide useful technical assistance models for other agencies.

HRP-0902753/3 PC **A05**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
HSA Activities in Primary Care Availability and Accessibility - Interim Report. Report of Telephone Survey for Performance Evaluation Program Study of Primary Care Availability and Accessibility.
Oct 80, 79p

Sponsored in part by Bureau of Healh Planning, Hyattsville, MD. See also HRP-0902752.

The study of a sample of 42 HSAs shows that HSAs actively address and impact primary care problems, especially in medically underserved areas. More than 90% of HSA are estimated to be currently devoting resources to primary care. Nearly all have had an impact on the availability of primary care resources and services, and an estimated 40% have also helped to remove barriers to primary care accessibility. Three fourths of the HSAs in the study have helped to increase the supply of primary care manpower including physicians, physician extenders, and dentists, and more than half have influenced the development of primary care centers. Other areas of impact include HMO development, provision of family planning services and maternal and child health services, reduced travel time to primary care, and others. Reported impact was generally greatest among HSAs serving areas with substantial rural and medically underserved populations. Most HSAs formally plan and manage their primary care projects. In varying degrees, they can cite measurable objectives, baseline status measures, progress indicators, and resource estimates, all of which contribute to enabling project progress and costs to be tracked against objectives. About half of all HSAs have adopted quantitative standards for estimating the deficiency or adequacy of the primary care system, particularly with respect to the supply of physicians and dentists. More than 80% of all HSAs devote at least half of one full-time-equivalent (FTE) staff member's time or at least 5% of total staff effort to primary care, and for about half the HSAs the figures are one or more FTE staff or at least 10% of staff effort. Since the typical HSA has fewer than ten professional staff members in all and has numerous planning, review, and resource development responsibilities in areas other than primary care, the priority given to primary care improvement is impressive. This is particularly evident in areas of greatest apparent need where agencies with small staffs are devoting high percentages of their time to primary care.

LA-8602-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Effect of Inflammation in the Lungs of Syrian Hamsters on Cellularity of Lavage Fluids.
J. Wilson, J. A. Steinkamp, and P. M. Kraemer. Nov 80, 8p
Contract W-7405-ENG-36

This study was undertaken to investigate the contribution of inflammatory response, when present in normal Syrian hamsters' lungs, to the fluctuations of cell yield and composition of lavage fluids. Rabbit and rodent lavage fluids have been extensively used to provide pulmonary alveolar macrophages for investigations of macrophage structure and function. Our interest is in the assessment of lung insult following exposure to particulates or gases using flow cytometric analysis. Our studies utilize the entire cellular component of lavage fluids, not merely isolated macrophages. These fluids contain basically three cell types (macrophages, leukocytes, and epithelial cells) in variable proportions and total numbers. The fluctuating values that were obtained have raised questions about the capacity of the lavage technique to reproducibly sample the exfoliative cell populations. Few of the animals had any significant degree of inflammatory response present in their lungs, and the data failed to show any reproducible correlations between yield and composition of lavage fluids and the pathologic state of the lungs. (ERA citation 06:008211)

N81-16727/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Rheoencephalography in Meniere's Disease.
M. P. Nikolayev, and O. N. Mertsalova. Sep 80, 7p NASA-TM-76387
Contract NASW-3199
Transl. Into English from Vestn. Otorinol-Laringol. (USSR), No. 3, May-Jun. 1979 p 12-15. Transl. By Kanner (Leo) Associated, Redwood City, Calif. Original DOC. Prep. By Botkin Clinical Hospital.

Rheoencephalography (REG) was used on 35 patients with Meniere's disease to determine tonus and perfusion of cerebral vessels. The analysis took account of age, duration of the disease and presence or absence of cervical osteochondrosis. Hypertensive symptoms in the vertebro-basilar system predominated in the under 45 age group, while for the over 45 patients and those suffering for more than 5 years, hypertensive symptoms were likewise noted in the internal carotid arterial system. Signs of angiospasm were revealed both for patients with cervical osteochondrosis and without it. Hypertensive signs were noted in 88.5% of patients with Meniere's disease and as a rule they were noted in the entire vertebro-basilar system without respect to the presence or absence of concurrent cervical osteochondrosis and uni- or bilateral affection of the labyrinth; in patients over 45 who had suffered more than 5 years this also applied to the internal carotid arterial system. Identification of the condition of cerebral circulation and the planning of more effective therapy that influences vascular tone is made possible by REG.

PAT-APPL-6-100 664 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Corneal-Shaping Electrode.
Patent Application,
J. D. Doss, and R. L. Hutson. Filed 5 Dec 79, 14p
Contract W-7405-ENG-36
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention relates to corneal reshaping and more particularly to electrodes utilizing radiofrequency electrical current to heat and thereby induce reshaping of the cornea in humans and animals. (ERA citation 06:005406)

PB81-148785 PC **A03**/MF **A01**
Stanford Univ., CA.
Hyperglycemia, Hyperlipidemia and Insulin Resistance in Chronic Renal Failure in Relation to Hemodialysis.
Final rept. Jan 75-Jun 78,
R. S. Swenson. 10 Jan 81, 39p AK-5-2213-F-81
Contract N01-AM-4-2213

The studies have focussed on three aspects of abnormal carbohydrate and lipid metabolism in uremia. The data indicated that acute uremia leads to marked changes in insulin metabolism in perfused rat muscle, resulting in a defect in insulin catabolism and a loss of normal insulin sensitivity. Since perfused liver from acutely uremic rats behaved normally in both of these regards, these results suggest that the hyperinsulinemia and insulin resistance of the uremic state is at least due in part to abnormal muscle metabolism. The insulin resistance and hyperinsulinemia in uremia was the focus of a second line of investigation, in which the author studied the effects of a decrease in dietary carbohydrate intake on plasma triglyceride (TG) levels in patients receiving chronic hemodialysis. The results indicated that the dietary manipulation led to a fall in plasma insulin levels, very low density lipoprotein production rates, and plasma TG levels. Finally, studies were carried out in acutely uremic rats which highlighted the potential role of the kidney as a gluconeogenic organ.

PB81-153165 PC **A03**/MF **A01**
Companhia Estadual de Tecnologia de Saneamento Basico e de Defesa do Meio Ambiente, Sao Paulo (Brazil).
Saneamento em Situacao de Emergencia (Health Care in Case of Emergency),
Arlindo Philippi, Jr. 1976, 31p
Text in Portuguese.

After a definition of an emergency situation this document describes their main causes such as floods, explosions, radiation, earthquakes and the like, considering the number of persons involved, loss of shelter, damages, interruption of water services, etc. It offers solutions--the first step being the establishment of a Headquarters for medical sanitary assistance. The Public Health efforts must count with the assistance of Air Forces and with University students, and emphasizing the choice of a water source and control of pollution of the same. Control of vectors and contamination of food are included.

PB81-153306 PC **A22**/MF **A01**
Wisconsin Univ.-Madison.
Prospective Evaluation Models for Physician Referral: Dissertation Final Report.
Executive summary 1 Jun 76-31 May 78,
Robert Lee Ludke. Jun 80, 525p NCHSR-81-51
Contract PHS-HS-02351

Two decision-making models, a Multi-Attribute Utility (MAU) model and a Bayesian Probability (BP) model, were developed and evaluated for predicting and explaining the implementation, using a breast cancer referral program as a case in point. Interviews with physicians and patients throughout the State of Wisconsin identified the factors used in the MAU and BP models to predict and explain whether or not a patient would be referred and, if so, where the patient would be referred. Because actuarial data regarding these factors were not available, the parameters of the models were subjectively estimated by physicians. Comparisons of predicted decisions with decisions made by referring physicians indicated that the models correctly predicted on the average 73% of the refer/not refer decisions and 80% of the where to refer decisions. Models that used fewer factors were found to correctly predict a greater percentage of the decisions than the full factor models. The explanatory validity and the predictive and explanatory reliability of the models varied depending upon the situation. Factors related to the technical/quality aspects of a patient's care appeared to be more important than patient and physician related factors in predicting and explaining the decisions.

PB81-153363 PC **A03**/MF **A01**
Stanford Univ., CA. School of Medicine.
Nutritional Aspects in Acute Renal Failure Following (Cardiac) Surgery.
Final rept. Jan-Dec 78,
R. S. Swenson. 10 Jan 81, 27p NIH-AK-1-8-2207-F
Contract N01-AM-8-2207

Total parenteral nutrition has been reported to reduce morbidity and mortality in patients with acute renal failure. Adequate therapeutic guidelines to provide optimal intake of amino acids and glucose have yet to be defined. For this reason, the applicability of a mathematical model to UN and NPN kinetics in patients developing acute renal failure following open heart surgery was examined. During 32 study periods (averaging 6 days each) nutrient intake was maintained stable. However, the patients received widely varying intakes of amino acids and glucose. Protein nitrogen balance was estimated from the amino acid nitrogen intake minus the kinetically determined UN or NPN generation rate. On an average, UN generation rates (11.2 plus or minus 1.8 g/day) exceeded amino acid nitrogen intake (6.0 plus or minus 1.2 g/day) by 5.6 plus or minus 1.6 g/day, indicating negative protein balance. The high generation rates indicated hypercatabolism. Increased nutrient intake correlated significantly with improved protein nitrogen balance for both glucose intake ($r=0.64$) and amino acid intake ($r=0.50$). Nonetheless, protein nitrogen balance became transiently positive in only 4 subjects, at which time amino acid intake averaged 1.0 g/kg/day and glucose, 50kcal/kg/day. The calculated generation of UN, and NPN, closely matched actual amounts of UN and NPN removed in validation studies. It is concluded that, in hypercatabolic acute renal failure, protein and energy requirements considerably exceed those conventionally prescribed.

PB81-154346 PC **A16**/MF **A01**
Washington Univ., Seattle.
Analysis of Priorities and Needs for Research in Dermatology.
Final rept.,
George F. Odland, and Kenneth K. Kraning. 17 Jul 79, 373p
Contract N01-AM-7-2215

The overall objective of the contributors to this report has been to define the problems, to inform on the prevalence, the severity, and the effect of dermatologic diseases on the quality of life, and to estimate their cost. In addition, the present status of prevention, treatment, and cure for given diseases was reviewed and a critical statement of current knowledge and status of research, both basic and clinical, was developed for each topic.

On the basis of information thus generated, each Special Study Group developed its own appraisal of the needs for additional basic and clinical research. Owing to the interlocking aspects of skin diseases, there is bound to be some duplication from chapter to chapter and, in the interest of space conservation, omissions of detailed information on each and every skin disease. It was thought best to retain the reiteration when an individual chapter would not otherwise be complete in itself. Every effort was made to mention the diseases not discussed and to cover in a broad way or, in a typical disease, the categories into which they fall.

PB81-154601 PC **A03**/MF **A01**
Veterans Administration, Washington, DC.
A Study of the Use of Restraints as a Nursing Measure,
Joyce E. Propst. May 69, 47p VA/NPR-45

A descriptive, evaluative study was undertaken to determine whether physical restraints, as a nursing measure, were being indiscriminately applied to patients on a long term nursing care unit. Preliminary data were collected from all of the wards at the Veterans Administration Center, Bay Pines, Florida. The study was then limited to the Intermediate Service and one ward of forty-four male veteran patients. The average age of the patients was 73 year old. Various nursing measures limited their physical movements. Because of the number of patients consistently restrained over a six week period as non-emergency nursing measures, and because of the lack of a written policy and nursing care procedure, it was determined physical restraints, as a nursing measure, were being indiscriminately applied to the patients on a long term nursing care unit. Remedial measures emphasized were - increasing ward staff participation, and extending an opportunity for personnel to become creatively involved while seeking to resolve problems.

PB81-154759 PC **A05**/MF **A01**
Veterans Administration, Washington, DC.
Role Perception of the Psychiatric Nurse: Whether a Lack of Role Consensus Is a Source of Role Strain,
Jean Marion Ritchie. Mar 70, 96p VA/NPR-48

An investigation was made of the degree of role consensus as perceived by a group of psychiatric nurses in a general hospital setting and of the amount of role strain which may be associated with incongruity in role perception. Statements of activities of psychiatric nurses were used in measurement of role consensus. A questionnaire was used in the study of role strain. Role consensus was found in perception of importance of categories of activities. Categories in order of perceived importance were found to be: Clinical Assistance to Nursing Team Members; Clinical Nursing Care; Provision of a Therapeutic Milieu; Promotion of Good Personal Habits; Joint Planning; Assistance in Utilizing Acceptable Social Behaviors; Counseling, and Appropriate Surrogate Role. Lack of consensus in ratings of individual activities was found in areas of working with community and family, and in consultation with others. Evidence of role strain was found to be prevalent in the area of meeting conflicting demands of various people.

PB81-155541 PC **A13**/MF **A01**
Iowa Univ., Iowa City. Dept. of Pediatrics.
Granulocytes: Studies of Collection, Function and Transfusion.
Final rept. 30 Sep 76-29 Sep 80,
Donald G. Strauss. Jul 80, 284p
Contract N01-HB-6-2973
See also PB-275 697.Portions of this document are not fully legible.

This contract was part of a multicenter effort aimed at defining the optimal conditions under which granulocyte and platelets can be harvested from normal donors employing the intermittent-flow centrifuge (IFC). The results demonstrated that a combined granulocyte and platelet concentrate could be prepared using the IFC and adding hydroxyethyl starch to the input-line to improve overall cell collection efficiency. The in vitro function of both granulocytes and platelets prepared by the technique were assessed and found not to be affected. This cell collection method was also not injurious to the donor or health. A second portion of this study evaluated the efficacy of transfusion granulocytes to patients with thrombocytopenia and neutropenia. The results of this investigation revealed that when granulocytes were given to patients prophylactically, bacterial sepsis was reduced, however, patients given granulocytes experienced a greater incidence of pulmonary infiltrates.

PB81-156424 PC **A04**/MF **A01**
Fogarty International Center, Bethesda, MD.
NIH International Research Fellowship Program, An Evaluation 1958-1977.
Research rept.,
Donald M. Pitcairn, and Jeffrey Liss. Jul 80, 62p
NIH/FIC-79-401

The subject of this program evaluation is the International Research Fellowship Program of the National Institutes of Health. This evaluation focuses on the period between 1958 and 1977. Data from various sources were analyzed according to program-wide and regional characteristics permitting both inter- and intraregional comparisons for the full-time course of the program and for 5-year intervals. In the analysis of the first 20 years of the IRFP, a number of characteristics and trends emerged. Variations in country participation, award rates, approved unfunded applications, disapproval rates, withdrawals, award and funding patterns, distribution of awards by region, host institutions, preceptors and postfellowship activity constituted the major findings of this study. Included in the report is a program critique which incorporates comments and observations from various sources pertinent to past activities, accomplishments, and program operation. Implications for the future course and direction of the program are also presented.

PB81-157497 PC **A06**/MF **A01**
New York Univ. Medical Center, NY. Dept. of Medicine.
Methods of Plasma Fractionation: Solid-Phase Reagents.
Final rept. 23 May 73-22 Dec 78,
Alan J. Johnson. Dec 78, 115p
Contract N01-HB-13-2971

The solid-phase ethylene/maleic anhydride PEs E-5 and E-100 were used to develop a flexible integrated system of batch methods for the fractionation of albumin and gamma globulin as well as the clinically important coagulation factors. Each method for the isolation and purification of the fractions or a modification of it could also be used independently or could be added onto another method or methods. Each fraction was prepared in three steps: adsorption on solid-phase PEs, elution from the PEs, and concentration by ultrafiltration or by use of PEG or both. Since the methods required no organic solvent but relied primarily on electrostatic bonding, they were essentially nondenaturing. Solid-liquid phase separation was easily accomplished by centrifugation or filtration. The yield and purity of each fraction was as follows: (1) coagulation factors II, VII, IX and X concentrates 63% and 200-fold purified; (2) AHF 29-50%, depending on the method, and 52-fold; (3) vWF 43% and 71-fold; (4) PPF, as albumin, 93% yield and 92% pure; (5) albumin 92% yield and 98.5% pure; and (6) gamma globulin 92% yield and 97.5% pure. During the preparation of gamma globulin the E-100 also tended to adsorb and remove the HBsAg and infectivity, when present. Toxicity studies in animals using aqueous extracts of PE E-5 and PE E-100 and with purified AHF, albumin and gamma globulin showed no abnormal results.

PB81-158743 PC **A02**/MF **A01**
Missouri Univ.-Columbia.
Cancer Mortality and Public Drinking Water in St. Louis City and County.
Journal article,
Carl J. Marienfeld, Michael D. Collins, Harley T. Wright, Ravula Reddy, and Gary Shoop. Nov 80, 7p EPA-600/J-80-203
Pub. in Jnl. AWWA 72, n11 p649-654 Nov 80.

The results of recent studies do not appear to implicate drinking water as a major factor in producing the considerably higher cancer mortality rates in the city of St. Louis than in St. Louis County, pointing instead to such socioeconomic factors as low income, low educational level, and occupation as a laborer and to air pollution.

PB81-158792 PC **A09**/MF **A01**
MACRO Systems, Inc., Silver Spring, MD.
Unit and Episode Costs of Mental Health Treatment.
Final rept.,
Lanny J. Morrison. 14 Dec 79, 192p NIMH-78-6
Contract NIMH-278-78-0019

This document represents an analysis of the unit cost and episode costs of mental health services in hospitals, CMHCs, ambulatory mental health clinics, and within modalities in such settings. The study not only determines a reasonable approximation of costs per unit of service across a variety of mental health treatment environments, but examines those factors that may contribute to variability in such costs, e.g., inpatient cost variables attributable to labor costs and staffing patterns, while emergency and outpatient cost variables are attributable to average time spent on each unit of service, i.e., the more services delivered, the less costly per unit cost. This study was not intended to provide us with a mean or median unit or episode cost of mental health services within the total universe of settings. Nonetheless, the provocative results suggests a potential for impact on policy development and program management with NIMH.

PB81-159303
(Order as PB81-159196, PC **A07**/MF **A01**)
Chinese People's Liberation Army Fourth Military Medical Coll., Chongqing.
Electrocardiogram Made on Ascending the Mount Qomolangma from 50M A. S. L.,
Shi Zhongyuan, Ning Xeuhan, Zhu Shoucheng, Zhao Deming, and Huang Pengguo. 3 May 79, 10p
Included in Scientia Sinica, v23 n10 p1316-1325 Oct 80.

In May 1975, one female mountaineer and eight male mountaineers once more climbed onto the highest peak of the world, Mount Qomolangma from the north slope. At the same time, 15 electrocardiograms were recorded while they were climbing from 7,600 m to the peak (8,848.18 m) through radio-operated electrocardiography. In this report the characteristics of electrocardiogram of six mountaineers were analyzed who ascended the peak at the stage from 50 m a.s.l, to over 8,200m a.s.l. The result proves that although obvious changes after reaching an altitude above 8,200 m from the plain region should be those of indexes of heart rates, the QRS axis, Q-Ta, Q-T/T-Q, P wave and T wave, there is no T wave diphasic, inverted, flat or abnormal shifting of S-T segment in the electrocardiogram of these outstanding mountaineers. This fully proves that those summit climbers are of excellent condition and good adaptation ability to hypoxia. This also shows that the people who have been trained and acclimatized under hypoxia conditions (including permanent altitude residents and native lowlanders) can maintain normal physiological functions under ultra-anoxia for quite a long time.

PB81-160624
(Order as PB81-160616, PC **A04**/MF **A01**)
Chinese Academy of Medical Sciences, Beijing. Capital Hospital.
Autopsy Analysis of 200 Stroke Cases,
Zang Xu. Aug 80, 8p
Included in Chinese Medical Jnl., v93 n8 p511-518 1980,

In 200 autopsies of stroke cases, there were 99 cerebral hemorrhages including hypertensive cerebral hemorrhage 78, cerebral blood vessel anomalies 7, anemia 5, leukemia 4, tuberculous meningitis 2, septicemic, cerebral hemorrhage 1, severe jaundice complicated by cerebral hemorrhage 1 and posttraumatic subdural hemorrhage 1. There were 53 cerebral infarctions in which there were cerebral embolisms 48, cerebral thrombosis 4 and cerebral venous thrombosis 1. There were also hypertension encephalopathy 15, cerebral tumors 33 including primary brain tumors complicated by hemorrhage 2, metastatic choriocarcinoma 25 and other metastatic carcinomas 6.

PB81-160632
(Order as PB81-160616, PC **A04**/MF **A01**)
Xian Medical Coll. (China). Second Teaching Hospital.
Optic Disc Vasculitis, Report of 42 Cases,
Chen Qingkui, and Zang Qi. Aug 80, 4p
Included in Chinese Medical Jnl., v93 n8 p519-522 1980.

Optic disc vasculitis may be of 2 different types, hence the fundus may show either marked edema of the optic disc or signs of central retinal vein obstruction without other ocular or systemic abnormality. 42 cases of this disease (51 eyes) are presented and analyzed in this paper.

PB81-160640
(Order as PB81-160616, PC **A04**/MF **A01**)
Academia Sinica, Shanghai (China). Shanghai Inst. of Materia Medica.
Plasma Progesterone Levels in Normal and Pregnant Chinese Women and Effects of Contraceptives on Them,
Gu Zhiping, Wang Weicheng, Lu Rongfa, and Jiang Ziujuan. Aug 80, 5p
Included in Chinese Medical Jnl., v93 n8 p523-527 1980.

Measurement of progesterone levels in peripheral plasma during normal human menstrual cycles and pregnancy by competitive protein binding assay shows that during the follicular phase mean plasma progesterone concentrations are 0.39 plus or minus 0.14 ng/ml. Its maximal value during the luteal phase is 8.9 plus or minus 1.87 ng/ml. On the day before or on the first day of menstruation the the level falls to 1.79 plus or minus 1.21 ng/ml. In early pregnancy the progesterone concentrations are similar to those during the luteal phase. Thereafter it rises gradually and peaks during late pregnancy, the maximal value being over 130 ng/ml. Anordrin can decrease plasma progesterone levels and shorten the luteal periods of treated women. AF-75 shows no conspicuous effect on ovulation or development of the corpus luteum.

PB81-160665
(Order as PB81-160616, PC **A04**/MF **A01**)
Suzhou Medical Coll. (China).
Hairy Cell Leukemia: Cytomorphology Histochemistry, Ultrastructure, Cell Surface Markers and Pathology, Report of 2 Cases.
Aug 80, 6p
Included in Chinese Medical Jnl., v93 n8 p531-536 1980.

Both cases studied presented with typical hairy cells and splenomegaly, establishing hairy cell leukemia (HCL) diagnosis. When white cell count is high, hairy cell percentage is also high. Case 1 with unique leukocytosis, unimproved by splenectomy and prednisone plus vincristine, showed improvement on leukerancyclophosphamide therapy. Hairy cells are probably lymphocyte-monocyte hybrids, but both of our cases conform to B lymphocyte. Pseudosinuses in the spleen are helpful to HCL diagnosis. Ribosome lamellar complexes and tartarate resistant acid phosphatase reaction are also helpful to the diagnosis but neither is HCL specific.

PB81-160673
(Order as PB81-160616, PC **A04**/MF **A01**)
Shandong Inst. of Parasitic Diseases, Jining (China).
Studies on Control of Malayan Filariasis in China,
Zhong Chonghu, and Zheng Huijun. Aug 80, 8p
Included in Chinese Medical Jnl., v93 n8 p537-544 1980.

Large scale control of malayan filariasis has been achieved in China by carrying out mass surveys and total population treatment mainly with diethylcarbamazine (DEC) or DEC medicated salt reducing the microfilaria rate to minimum levels. But surveillance and campaigns must be continued for at least 10 years. The authors have little experience in exterminating the Anopheles sinensis vector. The density of this species of vector is still fairly high here so further investigation and studies should be made in order to find a method of controlling it. This is the major task today.

PB81-160681
(Order as PB81-160616, PC **A04**/MF **A01**)
Chinese Academy of Medical Sciences, Beijing. Capital Hospital.
Hypoglycemia: Insulinoma or Islet Hyperplasia,
Liu Tonghua, Zeng Xianjiu, Zhu Yu, and Wu Weiran. Aug 80, 8p
Included in Chinese Medical Jnl., v93 n8 p545-552 1980.

A quantitative histologic method of pancreatic islet measurement is used in the analysis of hypoglycemic cases in order to find a basis for differentiating islet hyperplasia from insulinoma. Analysis of the results of measuring 20 normal control patients, 11 insulinoma patients and 6 hypoglycemic but exploration negative patients reveals that islet hyperplasia in the distal pancreas resected during exploration of hypoglycemic patients is an important criteria for differential diagnosis of islet hyperplasia from insulinoma. The methods of calculation and analysis are described and several aspects of quantitative analysis and differential diagnosis between islet hyperplasia and insulinoma are discussed.

PB81-160707
(Order as PB81-160616, PC **A04**/MF **A01**)
Sichuan Medical Coll., Chengdu (China).
Immunodiagnosis of Paragonimiasis by Counterimmunoelectrophoresis and Agar Gel Diffusion,
Hu Xiaosu, Feng Ruiyuan, Hu Anqi, Yan Heping, and Tian Guangzhao. Aug 80, 5p
Included in Chinese Medical Jnl., v93 n8 p557-561 1980.

The counterimmunoelectrophoresis (CIEP) technic is a rppid and accurate immunodiagnostic test for detecting paragonimiasis. 57 cases of paragonimiasis were examined by this method and all showed positive reactions. For comparison, their sera were also examined by agar gel diffusion (AGD) test. It was noted that the number of positive reactions obtained by AGD was 63% that by CIEP. The average CIEP titer was 13 times higher than the AGD. Only 1 (0.1%) of the 275 controls showed a false positive reaction by CIEP and no false positive was obtained by AGD. Follow-up observations on 34 cases were made after treatment. It was found that the majority of the cases (29/34, 85.3%) had negative CIEP reactions at 6 months or a little more after treatment.

PB81-160715
(Order as PB81-160616, PC **A04**/MF **A01**)
Zhejiang Medical Coll., Hangzhou (China). First Teaching Hospital.
Septicemia Due to Gram-Negative Bacilli, A Clinical Analysis of 60 Cases,
Liu Shuiqu. Aug 80, 3p
Included in Chinese Medical Jnl., v93 n8 p562-564

Through February 1964 to December 1974, 60 cases of septicemia due to gram-negative bacilli were treated in the First Hospital of Zhejiang Medical College. 61 strains of organisms were isolated from blood, 40 (65.6%) belonging to Escherichia coli, 9 (14.8%) Paracolon bacillus, 5 (8.2%) undifferentiated colon bacilli, 4 (6.6%) Pseudomonas aeruginosa, 1 (1.6%) Klebsiella pneumoniae, and Proteus and undifferentiated gram-negative bacillus were also isolated each in one (1.6%). Escherichia coli were mainly isolated from urine, ascitic fluid, sputum and pus. Most strains (over 50%) were sensitive to antimicrobials. Among the 60 cases (excluding 12 of self discharge) 21 were cured and 27 died, a mortality rate of 56.2% (27/48). The clinical manifestations were also discussed.

PB81-160723
(Order as PB81-160616, PC **A04**/MF **A01**)
Suzhou Medical Coll. (China). Children's Hospital.
High Remission Induction (Traditional Sino-Western HOAP) Regimen for Acute Nonlymphocytic Leukemia.
Aug 80, 4p
Included in Chinese Medical Jnl., v93 n8 p565-568 1980.

23 adults and 5 children with acute nonlymphocytic leukemia (ANLL) were given a traditional Sino-Western HOAP regimen for remission induction. The complete remission (CR) rate for the group was 82.1%, being higher for acute granulocytic leukemia, acute promyelocytic leukemia and erythroleukemia and somewhat lower for acute myelomonocytic and acute monocytic leukemia. During the induction regimen, supportive therapy with traditional Chinese medicine, blood transfusion, antibiotics and levimasole were important.

PB81-160731
(Order as PB81-160616, PC **A04**/MF **A01**)
Xinjiang Medical Coll., Urumqi (China). First Affiliated Hospital.
Immediate and Long-Term Results of Surgical Treatment of Intrathoracic Hydatid Cysts,
Qian Zhongxi, Guo Shuiyuan, Tang Guoxue, Liu Ruilin, and Wu Minghai. Aug 80, 4p
Included in Chinese Medical Jnl., v93 n8 p569-572 1980.

379 cases comprising 367 intrathoracic and 12 so-called 'liver-roof' hydatid cysts were seen from 1957 to 1975. A total of 347 cases were operated on with a mortality of 0.9% and 255 cases were operated on after 1968 with no death, 323 patients were followed up for 3-20 years, 13 of them died. All these 13 deaths but 1 (the cause of death was unknown) were not related to intrathoracic hydatidosis. 11 (3.4%) of the 223 cases had recurrence. Of the 32 cases which refused to be operated upon 6 died of hydatidosis. Of the remaining 26 cases, 5 were lost to follow-up and 21 survived, 9 of the latter showed no cysts.

PB81-160749
(Order as PB81-160616, PC **A04**/MF **A01**)
Bangbu Medical Coll. (China).
Ochronosis, A Case Report,
Huang Gongkang, and Wu Liansheng. Aug 80, 4p
Included in Chinese Medical Jnl., v93 n8 p573-576 1980.

Ochronosis is caused by an inherited metabolic defect resulting in the absence of the enzyme homogentisic acid oxidase. Large quantities of homogentisic acid are excreted in the patient's urine to produce alkaptonuria. Excessive homogentisic acid is present in the blood and chronic deposition of the black pigment appears between the second and third decade in the soft tissue. The clinical course of a 24-year-old male with ochronosis is described and previous reports of such uncommon disorder are reviewed.

PB81-160756
(Order as PB81-160616, PC **A04**/MF **A01**)
Xinjiang Medical Coll., Urumqi (China). First Affiliated Hospital.
Evaluation of Barrett's Technique in 167 Cases of Pulmonary Hydatid Cyst,
Qian Zhongxi, Guo Shuiyuan, Tang Guoxue, Liu Ruilin, and Wu Minghai. Aug 80, 4p
Included in Chinese Medical Jnl., v93 n8 p577-580 1980.

The authors consider removal of pulmonary hydatid cyst intact without needle aspiration (Barrett's technique) to be an ideal operation both for eradication of the disease and for maximal preservation of functionary lung tissues. This technique, however, has not been much used because of the risk of contamination following rupture of the cyst.

PB81-160764
(Order as PB81-160616, PC **A04**/MF **A01**)
Chinese Medical Association, Beijing.
Chinese Medical Literature.
Aug 80, 2p
Included in Chinese Medical Jnl., v93 n8 p581-582 1980.

Contents: The immuno-pharmacology of flores gonatanthus pumilus; Studies on drugs for coronary heart disease, I. Synthesis of ring compounds

with substituted amino-acetyl-amino group; Correlation between phylogeny, chemical constituents and therapeutic effects of rheum species; Crystalline retinal degeneration; Examination of regional lung function by dynamic pulmonary imaging with radioactive 133Xe; Preliminary estimation of tissue localization of hepatitis B surface antigen and core antigen.

PB81-170235 PC **A03**/MF **A01**
Stanford Univ., CA.
Decision-Making in Regional Health Planning Agencies: Final Report, Part II.
Final rept. 1 Feb 75-30 Sep 76,
Harold S. Luft, and Gary A. Frisvold. Jul 78, 39p NCHSR-81-55
Grant PHS-HS-01662

The model concentrates on understanding the decisions on individual proposals. The emphasis is on how the Comprehensive Health Planning (CHP) uses the data presented at the decision-making meeting in order to make a decision. Thus, the purpose of the model is not only to predict the outcomes, but also to explain why particular decisions occurred. In order to obtain the level of detail necessary to explain individual decisions, the model will be developed from the historical files of individual applications. The explanations will be derived by answering questions such as, 'what were the important issues in this case' and 'what data were used in making the decision.'

PB81-170243 PC **A07**/MF **A01**
Stanford Univ., CA.
A Descriptive Model of Decision Making in Regional Health Planning Agencies: Final Report, Part III.
Rept. for 1 Feb 75-30 Sep 76,
Harold S. Luft, and Gary A. Frisvold. Dec 76, 143p NCHSR-81-56
Grant PHS-HS-01662

The model is limited to considering only the certificate of need decisions of the regional Comprehensive Health Planning. It assumes that an areawide health plan with review criteria and estimates of the number of beds needed has already been developed and that a completed application has been submitted to the CHP for review. These simplifications allow focus primarily on the decision-making process. A result of this focus is that the model only predicts the decision on particular proposals. To estimate the net effect of a certificate of need program would require knowing which proposals would be submitted and which projects would be implemented without the program.

PB81-170250 PC **A06**/MF **A01**
Stanford Univ., CA. Dept. of Engineering-Economic Systems.
A Utility Criterion for the Markov Decision Process: Final Report, Part V.
Rept. for 1 Feb 75-30 Sep 76,
James Norfleet Eagle, II. Aug 75, 103p NCHSR-81-58
Grant PHS-HS-01662

The paper has been included in a series of papers on health care systems research because of its fundamental contribution to planning of dynamic systems and its potential application to health systems. It is concerned with planning although it is not set in the framework of health planning. The paper characterizes the planning process in terms related to the future consumption of resources and emphasizes the need to carefully order our priorities over the consumption stream and future decisions.

PB81-803959 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Radioimmunoassay Studies. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 253p
Supersedes PB80-804156, and NTIS/PS-79/0079.

The bibliography presents a compilation of references on the application of the radioimmunoassay test in biochemistry, clinical chemistry, immunology, microbiology, and pharmacology. (This updated bibliography contains 246 citations, 91 of which are new entries to the previous edition.)

PB81-803975 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Long Term Care: Home Health Services 1964-January, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jan 80.
Feb 81, 272p

The bibliography is a compilation of selected abstracts on health services rendered in the home to the aged, disabled, handicapped, sick or convalescent person who does not need institutional care. Topics covered are: levels of care, home health agencies, homemaker-home health aide services, personnel, financing, benefit cost analysis, health education, and planning for services. (This updated bibliography contains 263 citations, none of which are new entries to the previous edition.)

PB81-803983 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Long Term Care: Home Health Services. February, 1980-February, 1981 (Citations from the NTIS Data Base).
Rept. for Feb 80-Feb 81.
Feb 81, 44p
Supersedes PB80-804032, and NTIS/PS-79/0008.

The bibliography is a compilation of selected abstracts on health services rendered in the home to the aged, disabled, handicapped, sick or convalescent person who does not need institutional care. Topics covered are: levels of care, home health agencies, homemaker-home health aide services, personnel, financing, benefit cost analysis, health education, and planning for services. (This updated bibliography contains 35 citations, all of which are new entries to the previous edition.)

PB81-858045 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Antinuclear Antibody. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 138p NERACIRLNT2624

This retrospective bibliography contains citations concerning antinuclear antibody (ANA), its presence in autoimmune diseases, and the influence of drugs and drug therapy on its incidence. Although ANA appears in many diseases, particular attention is given to Lupus Erythematosis. Methodology for the detection of ANA, clinical studies, and research are discussed. (Contains 125 citations, fully indexed and including a table of contents.)

PB81-858151 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Paget's Disease. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 158p NERACIRLNT2974

This retrospective bibliography contains citations concerning paget's disease (osteitis deformans) and its treatment. The pathology of the disease is discussed as well as the possible implications of viral infection, enviromental and genetic factors in the etiology of this disease. The effectiveness (short term and long term) and side reactions of various drugs are outlined. (Contains 176 citations, fully indexed and including a table of contents.)

PB81-858169 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cushing's Syndrome. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 77p NERACIRLNT2975

This retrospective bibliography contains citations concerning cushing's syndrome. Various aspects of the disease are discussed. These include diagnosis, differentiation from alcohol-induced pseudocushing's syndrome and the laboratory tests available for a differential diagnosis. (Contains 73 citations, fully indexed and including a table of contents.)

PB81-858177 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Scleroderma. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 104p NERACIRLNT2978

This retrospective bibliography contains citations concerning scleroderma or systemic sclerosis. Discussed are the immunological aspects which include the role of lymphocytes, antinuclear antibodies, cytotoxicity and the immunoglobulins. Recent research work including HLA antigen studies and examination of vascular changes are outlined. (Contains 100 citations, fully indexed and including a table of contents.)

PB81-858391 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Plasmapheresis. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 75p NERACIRLNT3047

This retrospective bibliography contains citations concerning the use of plasmapheresis for the treatment of autoimmune diseases. The effects this treatment has on many patients with diverse conditions are detailed. (Contains 75 citations, fully indexed and including a table of contents.)

PB81-858409 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Sezary Syndrome. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 79p NERACIRLNT3045

This retrospective bibliography contains citations concerning Sezary's syndrome, a cutaneous malignancy of t lymphocyte origin. Its relationship to mycosis fungicides is detailed. The immunological manisfestations of the syndrome are discussed in detail. (Contains 68 citations, fully indexed and including a table of contents.)

PB81-858425 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Rhabdomyosarcoma. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 94p NERACIRLNT3053

This retrospective bibliography contains citations concerning the soft tissue tumor, rhabdomyosarcoma. Discussed are the four histiological types, diagnosis, and therapy (surgery, chemotherapy, and radiotherapy). The incidence in children and adults and survival rates are detailed. Case histories and unusual cases are cited. (Contains 90 citations, fully indexed and including a table of contents.)

PB81-858433 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Thyroiditis. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 136p NERACIRLNT3049

This retrospective bibliography contains citations concerning the autoimmune disease thyroiditis. Major discussion focuses upon Hashimoto's thyroiditis and Graves Disease (hyperthyroidism). Pyogenic thyroiditis, a condition which mimics the autoimmune disease, is also mentioned. The role of t and b lymphocytes, the association with the histo-

compatability antigen HLA and subacute thyroiditis (De Quervain's disease) are discussed. (Contains 124 citations, fully indexed and including a table of contents.)

PB81-858599 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Lipid Metabolism. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 120p NERACIRLNT3128

This retrospective bibliography contains citations concerning lipid metabolism as it relates to the use of contraceptives, diuretic therapy, stress, diet, toxic substances and alcohol. (Contains 105 citations, fully indexed and including a table of contents.)

PB81-858730 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Pyelonephritis. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 238p NERACIRLNT3126

This retrospective bibliography contains citations concerning the cause, diagnosis and treatment of pyelonephritis. Methods for localizing urinary infections are discussed. Treatment by many antibiotic therapies are discussed. The many types of bacteria involved in this infection are also discussed. (Contains 222 citations, fully indexed and including a table of contents.)

PB81-858805 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cirrhosis: Immunological Aspects. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 95p NERACIRLNT2775

This retrospective bibliography contains citations concerning cirrhosis and its immunological aspects. The citations discuss the role of circulating immune complexes, increased immunoglobin synthesis, the histocompatability antigens HLA, and the decrease in T-lymphocytes. Treatment of these disorders are briefly discussed. (Contains 83 citations, fully indexed and including a table of contents.)

PB81-859159 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cystic Fibrosis: Medical and Genetic Aspects. January, 1978-December, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Dec 80.
Feb 81, 185p NERACIRLNT3172

This retrospective bibliography contains citations concerning the medical and genetic aspects of cystic fibrosis. Cited are general immunological studies, investigations of the HLA antigen involvement, gene frequencies and the tests available for screening neonates and adults. In addition, the complications of bacterial infection and the selection of antibiotic therapy are detailed. (Contains 176 citations, fully indexed and including a table of contents.)

PB81-859167 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Hodgkins Disease and Radiotherapy. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Feb 81, 87p NERACIRLNT3136

This retrospective bibliography contains citations concerning radiation as a treatment of Hodgkins Disease. Radiotherapy is discussed in relationship to the disease stage and its location. The use of chemotherapy in conjunction with radiotherapy is also discussed. The side effects of radiotherapy are prominently mentioned. (Contains 76 citations, fully indexed and including a table of contents.)

PB81-859183 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Melanoma and BCG Immunotherapy. January, 1978-December, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Dec 80.
Feb 81, 91p NERACIRLNT3140

This retrospective bibliography contains citations concerning the assessment of BCG as therapy for melanomas. The mechanisms of action, complications and the role of lymphocytes and macrophages in the antitumor effect of BCG are discussed. (Contains 76 citations, fully indexed and including a table of contents.)

PB81-859191 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Melanoma and Chemotherapy. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Feb 81, 59p NERACIRLNT3139

This retrospective bibliography contains citations concerning chemotherapy and long term survival rates. Discussed are the effects of chemotherapy in conjunction with surgery and the therapeutic effects of chemotherapy alone. Both single drug and combination chemotherapy are also discussed. (Contains 49 citations, fully indexed and including a table of contents.)

PB81-859316 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Factors Affecting Vitamin D Metabolism. January, 1978-December, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Dec 80.
Feb 81, 138p NERACIRLNT3135

This retrospective bibliography contains citations concerning the effects of Vitamin D on metabolism and the effects of Vitamin D deficiency on metabolism. Human studies as well as studies on other species are cited. The effects of many chemicals and metabolites are discussed. (Contains 121 citations, fully indexed and including a table of contents.)

PB81-859571 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Digoxin: Therapeutic Considerations. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Feb 81, 129p NERACIRLNT3187

This retrospective bibliography contains citations concerning digoxin and the therapeutic considerations surrounding its use. Cited are the synergistic and antagonistic effects of other drugs when administered with digoxin. Prominently mentioned is the concomitant administration of digoxin and quinidine. The clinical manifestations of toxicity are prominently discussed. (Contains 122 citations, fully indexed and including a table of contents.)

PB81-859589 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Burkitt's Lymphoma: Immunological Aspects. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Feb 81, 79p NERACIRLNT2650

This retrospective bibliography contains citations concerning the role of Epstein-Barr virus (EBV) in Burkitt's lymphoma and other related diseases. The etiology, immunology, cytogenetics, and clinical manifestations are reviewed. The pathway of lymphocyte differentiation and the role of t and b lymphocytes in the immunological process are detailed. (Contains 60 citations, fully indexed and including a table of contents.)

PB81-859720 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Pericarditis. January, 1978-December, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Dec 80.
Feb 81, 80p NERACIRLNT3287

This retrospective bibliography contains citations concerning the microbiology, immunology and therapeutic considerations of pericarditis. The causitive agents, means of diagnosis, mortality rate and case histories are discussed. Purulent pericarditis of infants and children is also detailed. (Contains 77 citations, fully indexed and including a table of contents.)

PB81-859738 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Poststreptococcal Glomerulonephritis. January, 1978-December, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Dec 80.
Feb 81, 83p NERACIRLNT3278

This retrospective bibliography contains citations concerning the microbiology, immunology and clinical manifestations of poststreptococcal glomerulonephritis. The role of post-scabic glomerulonephritis and the possible role of organic solvents in the progression of the disease are cited. Complications and prognosis are also discussed. (Contains 72 citations, fully indexed and including a table of contents.)

SIS-1979-5 PC **A02**/MF **A01**
Statens Inst. for Straalehygiene, Oslo (Norway).
Report: Nordic Contact Meeting in Dosimetry, Oesteraas (Oslo) 6. And 7. September 1979.
J. Flatby, H. Fosmark, and H. Bjerke. 1979, 8p
In Norwegian.
U.S. Sales Only.

The main business of the meeting was a discussion of the new Nordic recommendations presented by a working group of the Nordic Association for clinical Physics, 'Procedures in external radiation therapy dosimetry with electron and photon beams with maximum energies between 1 and 50 MeV'. (Published in Acta Radiologica and available as a reprint). The differences from the recommendations of 1972 are discussed. An action programme for enacting the new recommendations at the standard laboratories is presented. Electron dosimetry under 12 MeV, not covered in the new recommendations, is discussed. (Atomindex citation 11:531467)

6F. Environmental Biology

AD-A094 785/3 PC **A03**/MF **A01**
California Univ., Irvine. Dept. of Community and Environmental Medicine.
Direct Exposure of Monolayers of Mammalian Cells to Airborne Pollutants in a Unique Culture System.
Annual rept. no. 3 (Final),
Ronald E. Rasmussen, and T. Timothy Crocker.
1 Feb 81, 40p AFOSR-TR-81-0093
Contract F49620-79-C-0083

The research was concerned with direct interaction between living mammalian cells and airborne pollutants. Mammalian cell lines were grown on cellulose ester membranes (Millipore) and exposed to test atmospheres in a specially designed system which maintained the cells in a viable state and in which pollutant concentrations were controlled and monitored. The specific tasks for this year have been to: (a) modify the exposure system to permit the use of organic vapors such as hydrazine and jet fuels; (b) measure the cytotoxic effects of mixtures of nitrogen dioxide and Ozone as well as hydrazine and jet fuels on human and animal cell lines. Effects on cell proliferation and DNA synthesis would be included; (c) Initiate studies to test the hypothesis that atmospheric oxidant gases such as N02 or 03 may react with hydrocarbon vapors, such as jet fuels, to produce toxic or mutagenic products; and (d) evaluate two cell strains from adult rat lung tissues for use in the exposure system studies. The use of organic vapors

in the exposure system has been facilitated by the employment of resistant materials such as stainless steel, Teflon, and silicone rubber as appropriate. The modifications have allowed generation of atmospheres containing aircraft fuels, hydrazine, and ethylmethane sulfonate. At the present state of development, the system can be arranged for small-scale exposures to single organic compounds with the addition of either O3 or NO2.

AD-A095 092/3 PC **A02**/MF **A01**
Office of the Chief of Engineers (Army), Washington, DC.
Benefit/Cost Analysis of Silvex Cancellation. Unit Day Value Method,
E. O. Gangstad. 9 Feb 81, 12p

Whereas the present system of analysis by the Environmental Protection Agency in the Rebutable Presumption Against Reregistraion (APAR) of silvex, defines the conditions that change the cost of agricultural production as benefits, the basic truth is that elimination of a herbicide such as silvex, has costs beyond and above the costs to agriculture. The system of analysis should consider all benefits to the nation, particularly in a time of economic stress. It is the total economy of the nation that must be taken into account. The conclusions from such an analysis could certainly change the decision on eliminating a herbicide. (Author)

AD-A095 159/0 PC **A11**/MF **A01**
Army Engineer Topographic Labs, Fort Belvoir, VA.
Vegetation and Terrain Relationships in South-Central New Mexico and Western Texas.
Rept. for 1978-1979,
Melvin B. Satterwhite, and Judy Ehlen. Nov 80, 230p Rept no. ETL-0245

Relationships between landforms and plant communities for a 650,000 hectare area in the Chihuahuan Desert; New Mexico and Texas, were studied using aerial photography and field observations. Techniques used showed that plant communities were associated with definite landform units, and with the soil depth, texture, and moisture characteristics in the various units. Four major landform-soil units were identified on which a specific plant community was found, accounting for more than 30 percent of the community's distribution. (Author)

CONF-7910138- PC **A99**/MF**$75.50**
Water Chlorination: Environmental Impact and Health Effects. Volume 3.
R. L. Jolley, W. A. Brungs, and R. B. Cumming. 1980, 1182p
Contract W-7405-ENG-26
Conference of chlorination: environmental impact and health effects, Colorado Springs, CO, USA, 28 Oct 1979.

The papers dealt with the major facets of chlorination and its associated effects. Each has been abstracted and indexed individually for ERA/EDB. (ERA citation 06:008278)

DOE/LC/10787-54 PC **A03**/MF **A01**
Stoecker (Robert E.), Boulder, CO.
Wildlife Studies for the Geokinetics' Kamp Kerogen Site, Uintah County, Utah.
R. E. Stoecker. May 79, 26p
Contract FC20-78LC10787

A four-season wildlife study was conducted on the Geokinetics site beginning May 1978 and ending May 1979. No threatened or endangered species were encountered on or near the study area (Section 2 plus a one-mile surrounding zone). No critical habitats or wildlife of special scientific interest or unusual occurrence were identified. Mule deer and elk occur on the study area. During the period of field investigations, deer were not very common, but were present most of the year. Only occasional signs of elk were observed, which suggested a rare and probably sporadic occurrence. Quantitative studies amenable to future monitoring programs were conducted on mule deer (pellet group counts and big sagebrush production-utilization studies), small mammals (live trapping), and birds (spring and summer transect counts). The research design used was systematic sampling in selected strata (pinyon-juniper woodland and sagebrush draws). (ERA citation 06:008117)

DOE/LC/10787-58 PC **A02**/MF **A01**
Olgeirson (Erik R.) Associates, Conifer, CO.
1978 Herbaceous Production Study.
E. R. Olgeirson. Mar 79, 21p
Contract FC20-78LC10787

Herbaceous productivity studies on the Geokinetics Oil Shale Project Research site in Uintah County, Utah were begun during the summer of 1978. These studies were designed to assess the amount of biomass produced by herbaceous vegetation in each of the vegetation types occurring on the site. Measurements were made in each of the control and treatment plots established for these types. The results given in this report are those obtained from the analysis of data collected during 1978. The chief objective of the herbaceous productivity study is to determine the amount of herbaceous biomass that is potentially available for use by herbivores on the LOFRECO site. As such, these studies are an intergral part of determining the carrying capacity of the site. The data collected from the 1978 study will be used together with other ecological information to provide a functional description of the site. Of particular importance in this synthesis are the data obtained from shrub utilization studies, phytosociological data, and the quantitative descriptions of the physical environment derived from ecoclimatic measurements. Herbaceous productivity will be monitored during the pre and post disturbance phases of the research site development. (ERA citation 06:008118)

DOE/MC/11284-T6 PC **A02**/MF **A01**
West Virginia Univ. Medical Center, Morgantown.
Effects of Coal Combustion and Gasification Upon Lung Structure and Function. Quarterly Progress Report.
12 Dec 80, 5p
Contract AT21-79MC11284

The effects on lungs of emissions from fluidized-bed combustion and coal gasification on man are being studied by inhalation experiments and intratracheal administration of fly ash to hamsters. The hamsters are sacrificed at 1, 3, 6, 9 and 30 days and the lungs examined by methods which are described. (ERA citation 06:006915)

IVL-B-549 PC **A02**/MF **A01**
Swedish Water and Air Pollution Research Lab., Fryksta.
Contents and Long Time Effects in the Littoral Zone after an Oil Spill. A Two Year Study of the Tsesis Oil Spill.
M. Notini. Mar 80, 16p
In Swedish.
U.S. Sales Only.

In 1977 a Russian tanker, Tsesis, grounded in the archipelago south of Stockholm, Sweden. 1000 tons of oil were spread in the sea. 400 tons were left in the environment after cleaning. The oil has caused considerable acute damage to the Fauna on the seashore. The balance between different species has been disturbed. During the two years following the oil spill the difference from the situation immediately before the accident has been greater as time has passed. The population of crustaceans has increased five times, while the population of molluscs (especially Theodoxus) decreased to a 10th. The content of aromatic and aliphatic substances in mussels increased rapidly after the oil spill, and has since then decreased slowly to the normal value. (ERA citation 06:004524)

LBL-11978 PC **A06**/MF **A01**
Bolt Beranek and Newman, Inc., Canoga Park, CA.
Evaluation of the Noise Impact of Satellite Power System Vehicles on the Community and Ecology at the Launch Site. Summary Report.
K. S. Pearsons, P. H. White, and J. F. Wilby. Dec 80, 109p
Contract W-7405-ENG-48

Placement of the Satellite Power System (SPS) satellites into orbit will require the launch of many heavy space vehicles over a 30-year period. These vehicles will generate rocket noise at launch, and sonic booms at launch and on return to the landing site. In this study, rocket noise levels and sonic boom pressures are predicted for the region around a typical launch/landing site. The response of humans and animals to broadband and impulsive noise is reviewed briefly, and the appropriate information is applied to the specific noise levels and sonic boom pressures predicted for the region around the launch/landing site. It is estimated that noise levels will be high enough that hearing protection will be required for personnel at the launch site, and that there will be significant annoyance (more than 5% highly annoyed) to the population within 9 km from the launch site. Infrasound (subaudio frequencies) will probably cause significant annoyance over a larger region. With launches over the ocean, the very high sonic boom pressures during ascent will occur over unpopulated areas. However, booms generated during descent of the orbiters will occur over populated areas, and it is predicted that there will be significant annoyance at distances up to 45 km from the launch/landing site. Because of uncertainties present in many areas of the study, further investigations are recommended, particularly with a view to obtaining information from Space Shuttle launches and returns. (ERA citation 06:007132)

ORNL-tr-4705 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Battling Overgrowths of Dreissena at Hydroelectric Power Plants.
M. Ya. Kirpichenko, V. P. Mikheev, and E. P. Stern. 1962, 6p
Contract W-7405-ENG-26
A, Elektr. Stn. 5 P30-32 1962.

The bivalve mollusk dreissena (Dreissena polymorpha Pallas) is widely dispersed not only throughout the rivers of the southern European part of the Soviet Union, but almost throughout all the rivers of Europe as well. This is due to its biological characteristics. By using its byssus (tuft of filaments) to adhere to the bottom of vessels it enters new water systems. Especially good conditions for habitation of dreissena are found in reservoirs constructed on rivers. Favorable hydrochemical and temperature modes, plentiful food and a large amount of underwater objects serving as habitation sites encourage the mass development of dreissena in reservoirs. Studies on the organism are reported. It is concluded that an overgrowth of dreissena in bodies of water in southeastern and southern parts of the USSR can result in faulty operation of hydroelectric power plants and piping systems. The most effective means of fighting overgrowths in industrial water supply systems at hydroelectric power plants at the present time is a periodic flushing with hot water at 45 to 55 exp 0 C. Continued observation of populations of dreissena in bodies of water is necessary as is research to determine new ways to effectively combat overgrowths. (ERA citation 06:006486)

PB80-921900 Standing Order
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Pesticide Product Information on Microfiche: Set A and B.
1980, 2 issues
Supersedes NTISUB/C/219. Includes NTIS/PR-380, Pesticide Product Information on Microfiche: A User's Guide (5th Edition).
Microfiche available on Standing Order, Deposit Account required. North American Continent price $150.00; all others write for quote.

The report includes pesticide information on product names, manufacturers, active ingredients, tolerances for residues, and site and pest information for particular products and active chemical ingredients. Also it contains Pest/Site Data.

PB80-922000 Standing Order
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Pesticide Product Information on Microfiche: Set A.
1980, 2 issues
Supersedes NTISUB/C/220. Includes NTIS/PR-380, Pesticide Product Information on Microfiche: A User's Guide (5th Edition).
Microfiche available on Standing Order, Deposit Account required. North American Continent price

$40.00; all others write for quote. Also available with Set B, as PB80-921900.

The report includes pesticide information on product names, manufacturers, active ingredients, tolerances for residues, and site and pest information for particular products and active chemical ingredients.

PB80-922100 Standing Order
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Pesticide Product Information on Microfiche: Set B (Site/Pest).
1981, 2 issues
Supersedes PB-265 550. Includes NTIS/PR-380, Pesticide Product Information on Microfiche: A User's Guide (5th Edition).
Microfiche available on Standing Order, Deposit Account required. North American Continent price $120.00; all others write for quote. Also available with Set A, as PB80-921900.

The report includes pesticide information on product names, manufacturers, active ingredients, tolerances for residues, and site and pest information for particular products and active chemical ingredients. Also it contains Pest/Site Data.

PB81-140022
(Order as PB81-139859, PC **A05**/MF **A01**)
Guangdong Inst. of Analysis (China).
Sex Pheromone of Corn Borer 'Ostrinia furnacalis',
Cheng Zhiqing, Xiao Jincheng, Huang Xianting, Chen Denglong, and Li Jianquan. 4 Apr 80, 6p
Included in Scientia Sinica, v25 n12 p1045-1051 Dec 80.

The preliminary tests showed that mixtures of E and Z12--14:Ac in nearly all possible ratios were attractive to males, but the most effective lures found in the field were the mixtures in the natural ratio. Furthermore, these tests also demonstrated that all lures with E and Z isomers in natural ratio exhibited attractive effect within a range of 5 x 10 to the minus 9th power -- 2 x 0.00001 g per trap, and mean trap catches with synthetic lures were always larger than those with 3 virgin females or 6 FE extract. For example, 19 traps were synthetic lures caught a total of 186 males; 7 traps with live virgin females caught a total of 13 males; and 1 trap with female tip extract caught only 2 males. Their mean catches were 9.8, 1.9 and 2 males/trap, respectively.

PB81-148587 PC **A02**/MF **A01**
Health Effects Research Lab., Research Triangle Park, NC.
Analytical Methodology for the Determination of Chlorophenols in Human and Environmental Samples.
Aug 80, 11p EPA-600/2-80-181

Methodology is presented for the determination of chlorophenols in human and environmental media. The methodology for air samples is a modification of the analysis of chlorophenols in blood and has not been fully investigated as to quantitative reliability.

PB81-154064 PC **A04**/MF **A01**
Tennessee Valley Authority, Muscle Shoals, AL. Office of Natural Resources.
Remote Sensing of Sulfur Dioxide Effects on Vegetation: Spectroradiometry,
C. Daniel Sapp. Sep 80, 54p TVA/ONR-80/11, EPA-600/7-80-159

Remote measurements of spectral reflectance were made in a laboratory to study sulfur dioxide (SO2) effects on the foliage of soybean (Glycine max (L.) Merr.) and winter wheat (Triticum aestivum) plants. The relationship between spectral reflectance and foliar injury from SO2 was analyzed by separating injury into its components--chlorosis and necrosis--and reflectance into bands within the visible and near-infrared spectra. Results indicate that, for winter wheat, total visible reflectance as well as individual wavelength bands could be used to distinguish the SO2 effects. Three classes of chlorosis and four classes of necrosis, based on severity, could be distinguished by their visible reflectance characteristics. These results indicate that remote sensors that measure visible reflectance may be able to distinguish moderate to severe injury to wheat from low altitudes. Scans of soybeans provided less positive results. There was no statistically significant (alpha = .05) difference among the means of blue, green, red, or near-infrared reflectance or the IR/R ratio when unaffected and chlorotic soybean classes were compared. However, significant (alpha = .05) differences in the means of green, red, and near-infrared reflectance (but not blue and the IR/R ratio) were found when unaffected and moderately to severely necrotic soybean classes were compared. Evidently, unless the SO2 injury to soybeans involves necrosis, reflectance-measuring remote sensors are not likely to detect it from even a low-flying (approx. 500 m above ground level) airborne platform. The necrosis symptom is generally associated with severe levels of foliar injury, whereas chlorosis usually predominates at moderate and light levels.

PB81-154080 PC **A04**/MF **A01**
Texas Instruments, Inc., Dallas.
Evaluation of C.P. Crane Generating Station Thermal Discharge Effects on the Finfish Community, Summer 1980.
Final rept.
Jan 81, 66p PPSP-CPC-81-1

The objective of this study was to verify if patterns of abundance observed during Summer, 1980 reflected response to the thermal discharge of the power plant or if they might be attributed to other factors. Fish were collected by both trawling and gill nets at seven stations. Results indicated that the patterns previously attributed to thermal effects may be better explained by habitat preference.

PB81-155418 PC **A02**
North Carolina Univ. at Wilmington. Dept. of Biology.
The Impact of Vehicles on Dune and Grassland Vegetation on a South-Eastern North Carolina Barrier Beach,
Paul E. Hosier, and Thomas E. Eaton. 1980, 13p UNC-SG-R-164, NOAA-80120911
Grant NOAA-NMFS-04-0-M01-66
Pub. in Jnl. of Applied Ecology, v17 p173-182 1980.Portions of this document are not fully legible.

Two barrier beaches in southeastern North Carolina were compared with respect to vegetation patterns and soil compaction. One had been widely used by off-road vehicles and the other had not. The vegetation cover and the number of species present on both dunes and grassland were fewer on the area that had been subjected to vehicular traffic. It is suggested that the reduction in vegetation cover may increase the intensity of oceanic overwash at this site. The soil was more compact where vehicular traffic had been most intense.

PB81-803827 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Biodeterioration of Oil Spills. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 145p
Supersedes PB80-803919, and NTIS/PS-79/0009.

The selected abstracts report on algae, bacteria, hydrocarbons, petroleum degradation, oil spills, beach cleanups and microbial degradation as related to biodeterioration of oil spills. (This updated bibliography contains 136 citations, 5 of which are new entries to the previous edition.)

6H. Food

AD-A094 892/7 PC **A05**/MF **A01**
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
Regional Food Distribution Characteristics and a Methodology for Redistribution in Accordance with Crisis Relocation.
Final rept. Jun 78-Aug 80,
William T. Olsen, and Richard G. RuBino. Jul 80, 80p
Contract DCPA01-78-C-0237
See also AD-A094 893

This research project involves the acquisition of data and development of a methodology for regional food support planning. The research attempts to resolve some of the existing difficulties (e.g., identification of existing distribution patterns, reallocation, transportation stress) in food distribution planning for crisis relocation by employing FEMA Region IV states as a prototype which is transferrable to the other FEMA regions. (Author)

AD-A094 893/5 PC **A15**/MF **A01**
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
Regional Food Distribution Characteristics and a Methodology for Redistribution in Accordance with Crisis Relocation. Appendices.
Final rept. Jun 78-Aug 80,
William T. Olsen, and Richard G. RuBino. Jul 80, 346p
Contract DCPA01-78-C-0237
Appendices to AD-A094 892.

See AD-A094 892 for abstract.

AD-A095 161/6 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Survey of the Bacterial Populations of Bologna Products.
Final rept.,
John T. Fruin, James F. Foster, and James L. Fowler. 30 Jan 80, 6p Rept no. LAIR-79-2
Pub. in Jnl. of Food Protection, v41 n9 p692-695 Sep 78.

No abstract available.

PB81-145005
(Order as PB81-144909, PC **A06**/MF **A01**)
Florida Univ., Gainesville. Dept. of Food Science and Human Nutrition.
Scanning Electron Microscopy of Squid, 'Loligo pealei': Raw, Cooked, and Frozen Mantle,
W. Steven Otwell, and George G. Giddings. Aug 80, 8p NOAA-80112805-10
Grant NOAA-04-6-158-44054
Prepared in cooperation with Fundacion Chile, Santiago. Also pub. as North Carolina Agricultural Experiment Station, Raleigh, Journal Series-Paper-5931.
Included in Marine Fisheries Review, v42 n7-8 p67-73, Jul-Aug 80.

Scanning electron microscopy (SEM) was used to investigate the tissue structure in raw, frozen, and cooked mantles from squid, Loligo pealei.

PB81-145013
(Order as PB81-144909, PC **A06**/MF **A01**)
National Marine Fisheries Service, Gloucester, MA. Gloucester Lab.
The Quality of Squid Held in Chilled Seawater Versus Conventional Shipboard Handling,
Vincent G. Ampola. Aug 80, 4p NOAA-80112805-11
Included in Marine Fisheries Review, v42 n7-8 p74-76, Jul-Aug 80.

The two objectives of this work were to compare the fresh shelf life of squid held in chilled seawater (CSW) after being caught versus squid held in the traditional manner--iced down in boxes or iced down in pens aboard ship, and to compare the organoleptic quality of squid frozen at sea immediately after capture against squid held in CSW, in boxes, and in pens aboard the boat and then frozen 1 to 2 days after capture.

PB81-145021
(Order as PB81-144909, PC **A06**/MF **A01**)
California Univ., Davis. Dept. of Food Science and Technology.
Development of a Squid Skinning and Eviscerating System,
R. Paul Singh, and Daniel E. Brown. Aug 80, 9p NOAA-80112805-12

Included in Marine Fisheries Review, v42 n7-8 p77-84, Jul-Aug 80.

A squid skinning and eviscerating machine was designed for California market squid, Loligo opalescens. Various operations such as orientation, cutting, skinning, and evisceration were completely automated. The pilot-scale machine cleaned squid at a rate of four squid per minute. Industrial scale-up for processing 10 tons of squid per 8-hour shift is explored in the paper.

PB81-145039
(Order as PB81-144909, PC **A06**/MF **A01**)
Aquabio, Inc., Belleair Bluffs, FL.
'Saki-ika': Dried Squid Processing Equipment and Markets,
Daniel J. Sheehy, and Susan F. Vik. Aug 80, 9p NOAA-80112805-13
Included in Marine Fisheries Review, v42 n7-8 p85-92, Jul-Aug 80.

Dried and seasoned squid products, in a wide variety of forms, are very popular in Japan. Over 400,000 tons of raw squid are processed into these products annually. Traditionally processed by hand and sun-dried, most of the processing and drying can now be accomplished with automated equipment. The manufacturing of 'daruma' and 'saki-ika' two forms of seasoned, dried squid which are not subject to Japanese import quotas, is described. The potential use of this technology for processing American squid for the large Japanese market is discussed.

PB81-158016
(Order as PB81-157984, PC **A16**/MF **A01**)
National Marine Fisheries Service, La Jolla, CA. Southwest Fisheries Center.
An Analysis of the United States Demand for Fish Meal,
D. D. Huppert. Nov 79, 11p NOAA-80120401-3
Included in Fishery Bulletin, v78 n2 p267-276 Apr 80.

This paper addresses the domestic demand for the primary industrial fishery product--fish meal. The paper presents maximum likelihood estimates of both the static and dynamic models. With either model the price elasticity of demand is high when fish meal price is low, and is low when price is high.

PB81-158123
(Order as PB81-157984, PC **A16**/MF **A01**)
National Marine Fisheries Service, Kodiak, AK. Northwest and Alaska Fisheries Center.
An Improved Method to Analyze Trimethylamine in Fish and the Interference of Ammonia and Dimethylamine,
Fern A. Bullard, and Jeff Collins. Dec 79, 10p NOAA-80120401-14
Included in Fishery Bulletin, v78 n2 p465-473 Apr 80.

The trimethylamine content of most marine fish, especially the gadoid species, is internationally accepted as an index of spoilage. However, ammonia, dimethylamine, and other amines also contribute to the trimethylamine value. Variations in the conditions of the three current methods used to analyze for trimethylamine content were studied in detail to determine the best condition to extract trimethylamine and to reduce the extraction of ammonia, dimethylamine, and other amines. To directly compare the methods, the trimethylamine content of a sample of spoiled walleye pollock, Theragra chalcogramma, flesh was determined by the three currently used methods and the cold method of extraction.

6J. Industrial (Occupational) Medicine

DOE/ET/13650-1 PC **A02**/MF **A01**
Meyer (A.F.) and Associates, Inc., McLean, VA.
Quarterly Report on the Safety Analysis and Review System for the Department of Energy's Fossil Energy Programs: Phase I.
E. T. Browne. Dec 80, 14p
Contract AM01-80ET13650

The purpose of this quarterly report is to summarize work performed to date by A.F. Meyer and Associates, Inc. (AFMA) under DOE Contract DE-AC01-80ET13650.002 in support of SARS implementation. Under this contract, AFMA is providing technical assistance to DOE to: analyze SARS data and develop recommended milestones for the Headquarters review requirements; analyze and recommend alternative procedures for conduct of such reviews and develop costs thereon; and support such Headquarters reviews and evaluate SARS activities at project and field analysis and review levels. (ERA citation 06:008318)

PB81-149676 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 78-40-558, Landalite, Inc., Fort Collins, Colorado,
B. J. Gunter. Jan 79, 7p NIOSH-HE-78-40-558

Environmental surveys were conducted on May 4, and August 15, 1978, to evaluate potential exposures associated with solvents, paints, and glues used throughout the Landalite, Incorporated (SIC-3069) facility in Fort Collins, Colorado. The evaluation was requested by the owner on behalf of three affected employees. Methyl ethyl ketone (CAS 78-93-3) (MED) concentrations ranged from 784 to 1,953 milligrams per cubic meter (mg/cu m) on the May 4 visit, exceeding the 590 mg/cu m OSHA standard. MEK sample concentrations were below OSHA standards on the August 15 visit. Methyl isobutyl ketone (CAS 108-10-1) (MIBK) and toluene (CAS 108-88-3) concentrations were below OSHA standards on both visits. The author concludes that workers were overexposed to MEK on May 4, 1978, that worker reported symptoms were consistent with overexposure to MEK, MIBK, and toluene, and the extremely high concentrations that were found did pose a health hazard even for short time exposures. A health hazard did not exist on August 15, 1978, when the ventilation system was working properly. The author recommends that solvents be placed in safety dispensing cans, eating be prohibited in the work area, and local exhaust ventilation be placed more directly in line with the glueing and painting operations.

PB81-150443 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. HE 78-76-548, Western Gear Corporation, Flight Structures Division, Highway 20 North, Jamestown, North Dakota,
W. Evans. Dec 78, 21p NIOSH-HE-78-76-548

Atmospheric samples were analyzed for methyl ethyl ketone (78933), methyl isobutyl ketone (108101), toluene (108883), butyl acetate (123864), cyclohexanone (108941), trichloroethylene (79016), oil mist, sulfuric acid (7664939), nitric acid (7697372), chromium (7440473), total particulate weight, aluminum (7429905), silver (7440224), copper (7440508) and ozone (10028156) and 24 employees were interviewed at Western Gear Corporation (SIC-3761), Flight Structures Division in Jamestown, North Dakota from June 5 to 8, 1978. An unidentified individual from the Corporation requested the evaluation on behalf of 150 affected production workers. Twenty four employees were administered questionnaires to obtain occupational histories. Worker exposures to organic vapors, acid mists and metal fumes were below OSHA standards. The author concludes that the employees are not exposed to hazardous chemical concentrations, however a potential overexposure to aluminum welders may exist from ozone gas. They recommend modifications to the exhaust ventilation system, the use of proper respirators and avoidance of contact with polymeric isocyanate foam.

PB81-150450 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. HE 78-35-568, American Broadcasting Companies, Inc., New York, New York,
R. M. Taft, and M. K. Haring. Mar 79, 18p NIOSH-HE-78-35-568

Air sampling for asbestos (1332214), L,L,L-trichloroethane (71556), and trichlorotrifluoro-ethane (75694) as completed to determine the potential for carcinogenic exposure to film editing and cleaning employees at American Broadcasting Companies, Inc. (SIC-7814) in New York on April 25 to 27, 1978. Epidemiological evaluations also were made. The Business Agent of Motion Picture Editors Local 771 of the International Alliance of Theatrical Stage Employees requested the survey on behalf of an unspecified number of workers. No asbestos fibers were detected. All concentrations of 1,1,1-trichlorethane and trichlorotrifluoroethane were below OSHA 8 hour time weighted average standards of 350 and 1000 parts per million, respectively. Two of five employees operating the ultrasonic film cleaning machines reported headaches, light headedness, loss of balance, and ringing in the ears, and four of five employees reported eye, nose, and throat irritation while loading and unloading the ultrasonic film cleaning machine and drying or defatting of skin cleaning film by hand. The investigators conclude that a health hazard from solvent vapors did not exist during testing, and that further epidemiological studies should not be made. They recommend that high nose level warning signs be posted at entrances to film cleaning rooms, emergency personal protective equipment be available in case of major chemical spills, and that ultrasonic film cleaners use chemical safety goggles and impervious gloves during bulk film cleaning. Proper storage and labeling of bulk chemicals, maintenance of exhaust hoods, reconnection of the ventilation system, and inspection of the room air conditioning for possible cross contamination were also recommended procedures for ultrasonic film cleaning.

PB81-150500 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. HE 77-108-520, Chevrolet - Transmission Plant No. 1, Toledo, Ohio,
C. L. Moseley. Aug 78, 13p NIOSH-HE-77-108-520

Environmental and medical surveys were conducted from March 21 to 23, 1978 to investigate employee exposure to oil mist and evaluate suspected cancers occurring as a result of the exposure at Chevrolet, Transmission Facility (SIC-3714) Number 1 in Toledo, Ohio. The investigation was requested by an authorized representative on behalf of approximately 50 affected employees. Analysis for oil mist in environmental samples indicated that exposures were below recommended criteria. Analysis of solvent vapors indicated the presence of benzene (71432) and toluene (108883) at concentrations below the recommended criteria. Analysis of bulk samples indicated the presence of coliform contamination, polynuclear aromatic hydrocarbons (PNA) and nitrosamines (35576911) at concentrations below recommended criteria. Medical surveys revealed that five of 17 workers had skin problems related to contact with the coolant oil. Medical records could not be obtained from employees suspected of suffering from occupational disease, therefore no conclusion could be drawn about the presence of an occupationally related cancer risk among the bar stock operators. The author concludes that there is little chance of exposure to coolant oils from inhalation but a good possibility exists of contact dermatitis developing among susceptible individuals. The author recommends that the operator use splash shields on the bar stock machines to avoid contamination, that operators be supplied with protective gloves, that bar stock machines be periodically steam cleaned and the coolant changed, that company industrial hygiene personnel periodically monitor the bar stock operation for nitrosamines, benzene, toluene, and PNAs and that possible fecal contamination of the coolant be investigated.

PB81-150518 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 77-36-540, ASARCO, Incorporated, Tacoma Plant, Ruston, Washington,
A. G. Apol, and M. Singal. Nov 78, 25p NIOSH-HE-77-36-540

Samples of lead (Pb) (7439921), copper (Cu) (7440508), cadmium (CA) (7440439), arsenic (As) 7440382), sulfur dioxide (SO2) (7446095), dimethylaniline (DMA) (127195), selenium (Se) (7782492), nickel (Ni) (7440020), and silver (Ag) (7440224) were analyzed and blood samples were tested for lead and free erythrocyte protoporphyrin (FEP) at the copper smelter and refinery of ASARCO, Inc. (Standard Industrial Classification-3325) in Tacoma, Washington in November 1977. An employee representative of the United Steel Workers Local 25, Tacoma, Washington requested toxicity determination on behalf of approximately 135 affected workers. Hematocrits ranged from 42 to 51 percent. Blood lead concentrations ranged from 16 to 41 micrograms per deciliter. Only one worker had an abnormally high FEP value of 197. In the roaster area, 37 of 44 time weighted average (TWA). As samples exceeded the OSHA criterion of 0.01 milligrams per cubic meter (mg/cu m) and 3 of 36 TWA Cu samples exceeded the OSHA criterion of 1mg/cu m. Seventeen of 21 as from the reverberatory furnace, 20 of 20 from the convertor area, and 3 of 7 from the slimes house also exceeded the OSHA standard. Six of 36 Pb samples from the convertor area and 1 of 2 from the slimes house also exceeded the OSHA criterion of 0.2mg/cu m. In the sulfur dioxide area, 2 of 2 as samples and 1 of 2 Pb samples exceeded the respective OSHA standard. The authors recommend that worker exposures to toxic substance be reduced below the OSHA criteria, and that appropriate NIOSH approved respirators be used. The action level for blood lead concentrations should be reduced from 80 to 40 micrograms per diciliter.

PB81-150526 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 77-69-522, Chicago Tribune, Chicago, Illinois,
S. A. Salisbury. Aug 78, 23p NIOSH-HE-77-69-522

Environmental and medical surveys were conducted on May 3 and 4, and September 29 and 30, 1977 to evaluate exposures to airborne ink mist at the Chicago Tribune (SIC-2711) in Chicago, Illinois. The evaluation was requested by the Business Representative for the Chicago Web Pressmans Union Number 7 on behalf of 350 pressmen, Junior Pressmen, and Apprentice Pressmen working in the pressroom. Many of the complaints and health problems reported by employees were not associated with ink mist exposure. One personal sample exceeded the OSHA standard of 5 milligrams per cubic meter (mg/cu m) for ink mist. Oil mist combined with ink mist during roller lubrication generated excessive mist exposure for the pressman. Airborne trace metals were below hazardous concentrations. Atmospheric sampling and analysis of black ink did not reveal the presence of polynuclear aromatic hydrocarbons. Benzidine (92875) and 3,3'-dichlorobencidine (91941) were not detected in the atmospheric yellow ink mist samples. The concentration and composition of the airborne paper dust was not considered hazardous. The author concludes that inhalation of ink mist and paper dust at the concentrations found in the pressroom did not pose a health hazard at the time of the surveys. Precautions should be taken to minimize exposure of the pressmen to ink mist generated by operating presses, pressmen should wear the disposable single use mist masks when servicing operating printing units, that pressmen who come in contact with inks should be instructed to wash their hands before smoking or eating, kerosene should be stored in fire resistant safety containers with self closing lids, and cleanup personnel should be provided with protective clothing.

PB81-151227 CP **T02**
Bureau of Labor Statistics, Washington, DC. Office of Occupational Safety and Health Statistics.
Supplementary Data System, Microdata File, New York, 1978.
Data file,
Norman Root, and George Taylor. 1978, mag tape BLS/DF-81/002
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-149982.

Tape contains records of individual occupational injuries and illnesses. Selected injury and illness factors were classified in accordance with standard definitions used in the Supplementary Data System of the Bureau of Labor Statistics. Each case record contains year, month and day of occurrence; nature of injury or illness, part of body affected, type of accident or exposure, and source of injury or illness; occupation, industry, age, sex, and weekly wages of injured or ill employee; and extent of disability and indemnity compensation. Technical documentation is available: PB80-149982, Supplementary Data System, Microdata Files, User's Guide, 1978-79. The data were compiled by the New York Workers' Compensation Board from records of workers' compensation cases closed during 1978 which involve death, eight or more lost workdays, or volunteer firefighters. The data include cases arising in private and public employments with these principal exceptions: local government employees in non-hazardous occupations, public school teachers in cities of over a million inhabitants, certain agricultural employees, household workers, and employees in religious, charitable, or educational institutions and corporations, railroad and maritime workers, and other employees covered under Federal compensation laws.

6K. Life Support

AD-A094 746/5 PC **A03**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.
Portable Life Support Stretcher Unit (PLSSU); Assembly Information.
Final rept. 1 Oct 79-31 Jul 80,
R. W. Kataoka. Aug 80, 32p Rept no. NOSC/TD-370

A portable life-support stretcher which can provide continuous uninterrupted casualty care and monitoring during the transportation phase of MEDEVAC operations has been developed at the Naval Ocean Systems Center under sponsorship of the Naval Medical Research and Development Command. This report describes the PLSSU and presents assembly figures as well as a summary list of commercially available parts required for assembly. (Author)

LA-8560-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Respirator Canister Evaluation for Selected Organic Vapors and Sorbent Performance Against Vinyl Chloride.
J. F. Stampfer, R. W. Weeks, Jr., and H. J. Ettinger. Oct 80, 40p
Contract W-7405-ENG-36

The protection afforded by one commercial organic vapor respirator canister (MSA/GMA) against chloroform, benzene, epichlorohydrin, acrylonitrile, propargyl alcohol, 1,2-dibromoethane, acrolein, chloromethyl methyl ether, and N-nitrosodimethylamine was determined. Six canisters simultaneously were challenged at 64 actual liters per minute with test atmospheres of these compounds at both 80% and < 15% relative humidity (RH). Breakthrough volume was defined as that volume of air which passed through the canister before the downstream concentration was 1% of the challenge concentration. Tests were continued until at least this concentration was attained or 16 h had elapsed, whichever occurred first. Under a moderate workload, these canisters should afford adequate protection against chloroform, benzene, and acrylonitrile for at least 4 h, epichlorohydrin for at least 8 h, and the remaining compounds (except chloromethyl methyl ether) for at least 16 h. Chloromethyl methyl ether at 80% RH exhibited a minimum penetration of 30% after only 34 min, and it appears that this and similar canisters will not provide adequate protection against atmospheres containing this compound. In all tests in which breakthrough occurred, the decrease in breakthrough time with increase in relative humidity was greater than would be expected from published literature. The capacities of a charcoal and Ambersorb 347 for vinyl chloride were determined. Challenge atmospheres were 10-ppM vinyl chloride at both 80% and < 15% RH. At 1% penetration, the calculated charcoal capacity was 2.0 mg of vinyl chloride per gram of sorbent at < 15% RH, and 0.52 mg/gm at 80% RH. The corresponding capacities for Ambersorb 347 were 0.68 and 0.36. Both sorbents, when used in respirator equipment, appear only marginally useful against vinyl chloride. (ERA citation 06:008057)

6L. Medical and Hospital Equipment

AD-A094 647/5 PC **A02**/MF **A01**
National Naval Dental Center, Bethesda, MD.
Physical Properties of a Repeatedly Used Nonprecious Metal Alloy.
Final rept. for period ending 1978,
Donald A. Hesby, Peter Kobes, Don G. Garver, and George B. Pelleu, Jr. 1980, 6p Rept no. NNDC-TR-055
Pub. in Jnl. of Prosthetic Dentistry, v44 n3 p291-293 Sep 80.

No abstract available.

CEA-BIB-214(Sup.3) PC **A08**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Service de Documentation.
Scintigraphic Instruments and Techniques in Nuclear Medicine.
B. Bornand, and Nov 79, 156p
In French.
U.S. Sales Only.

This bibliographical supplement brings out the importance assumed from now on by comparative studies on various imagery systems: radioisotopic scintigraphy, computerized tomography and ultra sonography. Another aspect to emerge is the anxiety of the medical world faced with ethical and economic problems in weighing up as accurately as possible the justifiability and consequences of clinical decisions, hence the value of visual observations and interpretations of images, as well as the quality of the instruments used. Four lists of bibliographical notices with abstracts covering the period late 1976-early 1979 mention 258 articles from journals, 67 conference lectures, 13 reports, 3 theses and 44 invention patents respectively. To these lists are attached the author, inventor and subject indices. (Atomindex citation 11:525956)

PB81-155889 PC **A16**/MF **A01**
Technische Hogeschool, Delft (Netherlands).
Image Quality of Medical X-Ray Systems,
Pieter Johannes 'T Hoen. 1980, 369p

The quality of images made by medical X-ray systems is of interest both for the user and for the developer of such systems. This thesis deals firstly with the development of subjective criteria and secondly gives a comprehensive physical description of imaging. Finally, some present X-ray systems are analyzed by combining these two areas of work.

PB81-160657 (Order as PB81-160616, PC **A04**/MF **A01**)
Guangdong Provincial Maternity and Child Health Inst., Guangzhou (China).
Flower Intrauterine Contraceptive Device,
Lu Zilan. Aug 80, 3p
Included in Chinese Medical Jnl., v93 n8 p528-530 1980.

This paper reports observations on 4,321 fertible women using the flower intrauterine device (IUD) from 1965-1977. The material was collected from 13 hospitals in Guangdong province.

6M. Microbiology:

AD-A094 640/0 PC **A02**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
Inactivation of Ebola Virus with Co(60) Irradiation,
Harold W. Lupton. 8 Sep 80, 7p

Ebola virus was inactivated in a log-linear relationship to Co(60) gamma-irradiation dosage with 1.0 log10 pfu/ml reduction in viral titer after 8 min exposure 23,000. (Author)

AD-A094 641/8 PC **A02**/MF **A01**
Army Medical Research Inst. of Infectious Diseases, Frederick, MD.
Plaque Assay of Ebola Virus,
James B. Moe, Rhonda D. Lambert, and Harold W. Lupton. 17 Oct 80, 13p

A plaque assay of Ebola virus is reported. The procedure has real potential for future research, although it is less sensitive than indirect fluorescent antibody and mouse inoculation tests. (Author)

AD-A094 903/2 PC **A05**/MF **A01**
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
Photobacterial Response to Cadmium Chloride, Mercuric Chloride, and Selenium Dioxide: Dose-Response and Interaction Studies.
Technical rept. Nov 78-Dec 79,
Ronald N. Shiotsuka, Paul H. Gibbs, and Susana Allongo. Jul 80, 89p Rept no. USAMBRDL-TR-8012

An ideal biologic toxicity screening system would have the following characteristics: (1) test organisms are simple to maintain, (2) organisms should possess a reproducible and easily measured endpoint, (3) simultaneous testing of a large number of individuals is permitted, (4) screening of several chemicals during each screening test is permitted, (5) the duration of each screening test is of reasonable length, and (6) the response of the organisms is dose dependent. The photobacterial toxicity screening system used in this study meets these criteria: the photobacteria are easily grown in a liquid medium and require subculturing once daily; their luminescent response is reproducible and accurately measured by a photometer; a large number of chemicals may be screened during an 8- to 9-hour span; and the response of the photobacterial bioluminescent activity is dose dependent to at least one group of compounds tested-nitrotoluenes. The objective of this study was to determine the dose-response characteristics of the photobacterial toxicity screening system (PTSS) when challenged by cadmium chloride, mercuric chloride, and selenium dioxide in aqueous solutions and to determine the response of the PTSS to various combinations of these three compounds.

AD-A094 971/9 PC **A02**/MF **A01**
Defence Research Establishment Suffield, Ralston (Alberta).
Protocol for Operational Testing of a New Biological Sample Transport Medium,
A. R. Lejeune. Nov 80, 9p Rept no. DRES-SM-1012

A new medium designed to improve the survival of bacterial samples during transport to assay laboratories is under development at the University of Calgary. The development has reached a stage where operational testing of the medium is appropriate. The test will be conducted by shipping throat swabs from known Neisseria meningitidis carriers in the recruit school at CFB Cornwallis to a laboratory at the University of Calgary in the new transport medium. The purpose of this report is to describe the procedures to be used for selecting the recruits, obtaining samples, labelling, packing and shipping samples and reporting the results. (Author)

AD-A094 990/9 Not available NTIS
Maryland Univ., College Park. Dept. of Microbiology.
Bacteria Associated with False-Positive Most-Probable-Number Coliform Test Results for Shellfish and Estuaries,
David Hussong, John M. Damare, Ronald M. Weiner, and Rita R. Colwell. 1980, 11p
Contract N00014-76-C-0405
Availability: Pub. in Applied and Environmental Microbiology, v41 n1 p35-45 Jan 81 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A095 002/2 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Histamine Production by Klebsiella pneumoniae and Incident of Scombroid Fish Poisoning.
Final rept.,
Steve L. Taylor, Linda S. Guthertz, Matthew Leatherwood, and Ellen R. Lieber. 27 Nov 78, 7p Rept no. LAIR-79-043
Pub. in Applied and Environmental Microbiology, v37 n2 p274-278 Feb 79.

No abstract available.

AD-A095 163/2 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Colony Count Accuracy Using Selective Media: Analysts versus Automatic Colony Counters.
Final rept.,
Linda S. Guthertz, and John T. Fruin. 23 Oct 78, 6p Rept no. LAIR-79-051
Pub. in Jnl. of Food Protection, v42 n5 p420-423 May 79.

No abstract available.

AD-A095 168/1 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Leishmania braziliensis and Leishmania mexicana: Experimental Cutaneous Infections in Golden Hamsters.
Final rept.,
H. Robert Wilson, Barbara S. Dieckmann, and George E. Childs. 8 Jan 79, 16p Rept no. LAIR-79-052
Pub. in Experimental Parasitology, v47 p270-283 1979.

No abstract available.

PB81-156697 PC **A09**/MF **A01**
National Training and Operational Technology Center, Cincinnati, OH.
Bacteriological Methods in Water Quality Control Programs: Instructor's Guide,
Rocco Russomanno. Sep 80, 184p EPA-430/1-80-015

This manual is designed for use by instructors who will have to teach others how to perform analyses for bacteriological parameters. It is to be used in conjunction with the training manual bearing the same title (EPA-430/1-80-004). It includes topics related to the presentation of training courses in which the analyses would be taught. These topics include: the course description, personnel needed to conduct the training, the course agenda, a milestones list for planning and preparing the course, instructional resources available to support the instruction and a list of equipment and supply requirements. Also included are Instructional Package Worksheets (lesson plans) giving details relative to presenting instruction regarding each of the analyses covered in the associated student reference manual.

PB81-803967 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Herpes Virus. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 174p
Supersedes PB80-804164, and NTIS/PS-79/0067.

The selected abstracts of research reports cover infectious diseases, blood transfusion, serodiagnosis, epidemiology, antigens and antibodies, antiviral agents and immunology as related to herpes virus. (This updated bibliography contains 170 citations, 7 of which are new entries to the previous edition.)

UR-3490-1851 PC **A02**/MF **A01**
Rochester Univ., NY.
Optical Diffraction and Spatial Filtering of Electron Micrographs of Biological Materials.
G. H. Wever, P. Dunn, J. S. Wiberg, and B. J. Thompson. 1980, 12p CONF-800453-3
Contract AC02-76EV03490
International optical computing conference, Washington, DC, USA, 7 Apr 1980.

Optical diffraction and spatial filtering methods have been used to determine the characteristics of periodic structures in many biological materials. The head shell of bacteriophage T4 was chosen for this study, since aberrations in the assembly of the shell due to mutation or changes in growth conditions lead to the formation of a variety of elongated tubular head forms. The lattice parameters of structures assembled at elevated growth temperatures by normal, wild-type T4 and by a mutant (regA) were analyzed using optical diffraction patterns obtained from electron micrographs. Spatial filtering procedures were used for the reconstruction of one-sided images to determine the characteristics of the head structures assembled under different growth conditions. (ERA citation 06:008206)

6O. Pharmacology

AD-A094 856/2 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Determination of Adiphenine Hydrochloride and Diphenylacetic Acid by Ion-Pair High-Performance Liquid Chromatography,
Nesbitt D. Brown, John P. Scovill, H. Kenneth Sleeman, and Bhupendra P. Doctor. 9 Jul 80, 5p
Pub. in Jnl. of Chromatography, v200 p267-270 1980.

No abstract available.

AD-A094 860/4 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Chemosuppressive Field Trials in Thailand. IV. The Suppression of Plasmodium falciparum and Plasmodium vivax Parasitemias by Mefloquine (WR 142,490, a 4-Quinolinemethanol),
Eliot J. Pearlman, Edward B. Dobertstyn, Somphong Sudsok, Withoon Thiemanun, and Robert S. Kennedy. 1 Mar 80, 8p
Pub. in the American Jnl. of Tropical Medicine and Hygiene, v29 n6 p1131-1137 1980. See also AD-A054 337.

No abstract available.

AD-A094 864/6 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Host - Protozoa - Drug Interactions in Targeted Chemotherapy,
Edgar A. Steck. 1980, 10p
Pub. in the Host Invader Interplay, p575-582 1980.

No abstract available.

AD-A095 164/0 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Heme Oxygenase Activity, Drug Metabolism, and Ascorbic Acid Distribution in the Livers of Ascorbic Acid-Deficient Guinea Pigs.
Final rept. for 1979,
Stanley T. Omaye, and J. David Turnbull. 24 Jul 78, 7p Rept no. LAIR-79-050
Pub. in Biochemical Pharmacology, v28 p1415-1419 1979.

No abstract available.

PB81-158859 PC **A12**/MF **A01**
MACRO Systems, Inc., Silver Spring, MD.
Product Utilization Survey.
Final rept.,
Michael T. Errecart, and Sheila L. Gibbons. Aug 79, 256p DHEW/PUB/ADM-78-082
Contract PHS-ADM-271-78-4608

The purpose of this project was to conduct a product utilization survey of federally funded drug abuse intervention programs, other drug abuse programs, Single State Agencies for Drug Abuse Prevention, and other constituent representatives. The objective of the study was to identify the extent to which people in certain NIDA audiences used DRD publications and the extent to which needs for additional material existed. The study was conceived as a broad brush effort covering most of DRD's audiences and most of its publication activities. It was not an attempt to evaluate individual publications, to investigate specific needs, or to characterize fully the manner, use, and internal management of DRD publications.

PB81-159295
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Shanghai (China). Shanghai Inst. of Biochemistry.
Insulins from Different Species--Chicken and Snake,
Cao Qiuping, Li Tongfen, Peng Xinghua, and Zhang Youshang. 7 Feb 80, 7p
Included in Scientia Sinica, v23 n10 p1309-1315 Oct 80.

The authors have worked out a new adsorption method for the preparation of insulins from different species. At present, the authors are mainly involved in chicken and snake insulins. In all insulins so far studied, only chicken insulin has been reported to have much higher activity. However, results from different laboratories are quite different from one another. The authors have obtained chicken insulin in typical rhombohedral crystalline form and determined its activity in vivo which is not appreciably different from that of porcine insulin. From the pancreas of a non-venomous snake, Zaocys dhumnades (Cantor), the authors have prepared snake insulin which is different from rattle snake insulin reported earlier. The dodecahedral crystals of the snake insulin are similar to those of zinc-free porcine insulin.

6P. Physiology

AD-A094 675/6 PC **A02**/MF **A01**
New Mexico State Univ., Las Cruces. Behavioral Engineering Lab.
Locus of the Stimulus to Visual Accommodation: Where in the World, or Where in the Eye.
Interim rept.,
Jan Christopher Hull, Richard T. Gill, and Stanley N. Roscoe. Nov 79, 19p BEL-79-5/AFOSR-79-9, AFOSR-TR-81-0082
Grant AFOSR-80-0024

In two experiments, observers judged the apparent size of a collimated disk of light (a simulated moon) projected just above the horizon a real and virtual scenes by means of a stimulus presentation device, the 'moon machine.' As these judgments were registered, masks obscured various bands of the lower half of the visual field. Immediately following these judgments measurements of the observers' visual accommodation were made using a laser optometer. Results showed a strong correlation between mean apparent size and mean accommodation shift. Major conclusions were (1) viewing a virtual (collimated) image of a real scene is not the same as viewing the real scene, (2) for natural (real) scenes the retinal locus of scenic texture is the primary determinant of apparent size, whereas for virtual images it has a more reliable effect on visual accommodation, and (3) whatever the relationship between apparent size and visual accommodation is, their mean correlation is in excess of 0.90. These findings agree well with, and extend, those of Iavecchia, Iavecchia, and Roscoe (1978) and Simonelli and Roscoe (1979). (Author)

AD-A094 774/7 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Viscoelastic Finite Element Model of the Human Intervertebral Joint.
Master's thesis,
Ronald L. Hinrichsen. Dec 80, 107p Rept no. AFIT/GAE/AA/80D-11

The combined mechanical stresses on aircrewmen have become increasingly acute as technological developments extend the flight envelopes of our high performance aircraft. Limitations on the design of this type of aircraft are frequently dictated by human tolerance. The concept of an analytical model to evaluate the biomechanical response of the human intervertebral joint, under the influence of long term axial compressive loading, is important in assessing the load carrying capability of normal and diseased vertebral segments. It has been experimentally demonstrated that healthy intervertebral joints are composed of materials which exhibit creep characteristics. This investigation is significant because it presents a study of the time dependant behavior involved. An axisymmetric finitie element model is employed which incorporates a linear viscoelastic constitutive relation for the intervertebral disc. Viscoelastic material constants are found by matching one-dimensional data with the two-dimensional model. Results are presented depicting displacement profiles and stress redistributions occurring as a consequence of the inclusion of these viscoelastic parameters which, for the first time, simulate the actual human response to high compressive loads over a specific time span. (Author)

AD-A094 791/1 PC **A03**/MF **A01**
California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.
Hygroviscoelasticity of the Human Intervertebral Disc.
Final rept.,
W. G. Knauss. Jul 80, 26p GALCIT-SM-80-18, AFOSR-TR-81-0084
Grant AFOSR-77-3139

In an effort to develop non-invasive diagnostic tools such as x-ray tomography the mechanical properties of human disc material were studied. Special attention was given to the anisotropic layer structure of the disc annulus in studying lamella behavior as well as multi-layer averaging relaxation properties. Viscoelastic response is significantly affected be water concentration in the material, a fact that is of utmost importance for control in laboratory testing. (Author)

AD-A094 793/7 PC **A03**/MF **A01**
Northwestern Univ., Evanston, IL. Cresap Neuroscience Lab.
Enhancing Sensitivity to Visual Motion.
Final rept.,
Robert Sekuler. May 80, 38p AFOSR-TR-81-0090
Grant AFOSR-79-0064

This report reviews a one-year investigation of techniques that might enhance an observer's sensitivity to moving targets. The five experiments reported here cover a broad range of such techniques. Experiment I measured direction difference thresholds as a function of target velocity for 39 observers. Despite large (nearly fourfold) individual differences in thresholds, it was clear that ability to tell what direction a target moved in depended strongly on its velocity. In addition, this ability was seriously degraded for an oblique direction compared to performance with upward motion. Experiment II showed that this variation in threshold with target velocity was independent of the distance traveled by that target. This finding contradicts one common theory of motion preception. Experiment III measured difference thresholds for direction at various points in the course of training with a reaction time task. This task required observers to respond rapidly to moving targets presented after exposure to the broadband or filtered directional noise. The reaction times to motion onset decreased with practice but the direction difference thresholds did not show any comparable change. Experiment IV examined the effect of practice on the performance deficit produced by an observer's uncertainty about the direction in which a to-be-detected target would travel.

AD-A094 805/9 PC **A02**/MF **A01**
Northwestern Univ., Evanston, IL. Cresap Neuroscience Lab.
Detection of Motion under Target Uncertainty and Peripheral Presentation.
Final rept.,
Robert W. Sekuler. Aug 80, 23p AFOSR-TR-81-0089
Contract F49620-79-C-0088

We have developed a model to account for the loss in visibility of moving targets that occurs when an observer is uncertain about the target's direction of motion. The model's key features are an array of directionally selective visual mechanisms and a rule governing the mechanisms from which an observer will derive sensory data. In response to uncertainty about two possible directions of motion, the observer is assumed to use a mechanism whose peak sensitivity is to a direction midway between the two possible directions. Seven experiments, using both reaction time and forced-choice data, demonstrate the predictive advantages of this midway model over competing single-band and multiple-band models. Additionally, the experiments reveal several new properties of human motion perception: Direction and velocity information have orthogonal representations in the visual system; although motion sensitivity does not vary with direction, the precision with which small changes in direction can be recognized does, reflecting differential breadth of tuning for directionally selective mechanisms sensitivity to various directions; and motion-analyzing mechanisms are broadly tuned for direction as well as speed. (Author)

AD-A094 858/8 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Magnesium Metabolism in Potassium - Adapted Rats,
Cristobal G. Duarte. 1980, 13p
Pub. in Magnesium in Health and Disease, v13 p93-103 1980.

No abstract available.

AD-A095 165/7 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Food Intolerance in Humans.
Final rept.,
Robert H. Herman, and Louis Hagler. 1978, 24p
Rept no. LAIR-79-037
Pub. in Western Jnl. of Medicine, v130 p95-116 Feb 79.

No abstract available.

AD-A095 166/5 PC **A03**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
The Interaction between the Gastrointestinal Tract and Nutrient Intake.
Final rept.,
Robert H. Herman. 1979, 37p Rept no. LAIR-79-064
Pub. in Human Nutrition-A Comprehensive Treatise, v4 p105-140 1979.

No abstract available.

N81-16725/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Autoregulation of Cerebral Blood Circulation under Orthostatic Tests.
M. D. Gayevyy, V. G. Maltsev, and V. E. Pogorelyy. Sep 80, 10p NASA-TM-76372
Contract NASW-3199
Transl. into English from Fiz. Zh. SSR (USSR), V. 65, No. 2, 1979 p 263-268. Original Language Document Announced as A79-36098. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Pyatogorsk Pharmaceutical Inst., USSR.

Autoregulation of cerebral blood flow (ACBF) under orthostatic tests (OT) was estimated in acute experiments on rabbits and cats under local anesthesia according tc changes of perfusion pressure (PP) in carotid arteries, cerebral blood flow, pressure in the venous system of the brain, and resistance of cerebral vessels. The OT were

conducted by turning a special table with the animal fastened to it from a horizontal to a vertical (head up or head down) position at 40 to 80 deg. In most experiments ACBF correlated with the changes of PP. Different variations of ACBF and its possible mechanisms are discussed.

N81-16726/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Effect of Cervicolabyrinthine Impulsation on the Spinal Reflex Apparatus.
A. I. Yarotskiy. Sep 80, 7p NASA-TM-76375
Contract NASW-3199
Transl. into English of Fiziol. Zh. SSSR (USSR), V. 75, No. 12, Dec. 1979 p 1838-1840. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Uzbek Inst. For Physical Culture, Tashkent, USSR.

In view of the fact that the convergence effect of vestibular impulsation may both stimulate and inhibit intra and intersystemic coordination of physiological processes, an attempt was made to define the physiological effect on the spinal reflex apparatus of the convergence of cervicolabyrinthine impulsation on a model of the unconditioned motor reflex as a mechanism of the common final pathway conditioning the formation and realization of a focused beneficial result of human motor activities. More than 100 persons subjected to rolling effect and angular acceleration during complexly coordinated muscular loading were divided according to typical variants of the functional structure of the patella reflex in an experiment requiring 30 rapid counterclockwise head revolutions at 2/sec with synchronous recording of a 20 item series of patella reflex acts. A knee jerk coefficient was used in calculations. In 85 percent of the cases 2 patellar reflexograms show typical braking and release of knee reflex and 1 shows an extreme local variant. The diagnostic and prognostic value of these tests is suggested for determining adaptive possibilities of functional systems in respect to acceleration and proprioceptive stimuli.

N81-16728/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Hydroelastic Effects in the Aorta Bifurcation Zone.
A. S. Volmir, M. S. Gersheyn, and B. A. Purinya. Oct 80, 7p NASA-TM-75432
Contract NASW-3199
Transl. Into English of Mekh. Polim. (USSR), V. 7, Jan. - Feb. 1971 p 164-165. Original Language Document Announced as A71-28657. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Latvian SSR Acad. Of Sci., USSR.

The mechanical behavior of the vessels and blood is mathematically analyzed at the point of aortic bifurcation using a homogeneous single layer channel as a model of the aorta. Allowance is made for the fact that the aortic intima is considerabley less rigid than the other layers. For analysis of blood flow in the major arteries, the blood is treated as a viscous Newtonian fluid whose movements are described by Navier-Stokes equations and a continuity equation. Blood flow dynamics at the aortic bifurcation are discussed on the basis of the results.

PB81-159014 PC **A02**/MF **A01**
Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazoni.
ESR of Ceruloplasmin and Iron Transferrin in Human Serum During Pregnancy,
Maria Brai, Melchiorre Brai, P. L. Indovina, M. Messina, and G. Moscatelli. 1980, 24p ISS-P-80/4
Text in English and Italian. Also pub. as ISSN-0390-6469.

Transferrin-Fe3+ and ceruloplasmin-Cu2+ have been studied by ESR in serum samples from health donors and pregnant women. Results clearly show that a different balance of the two metalloproteins is being mantained in pregnancy as compared to normal controls. Data are interpreted on the light of metabolic requirements and according to the ferroxidasic model.

PB81-803835 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Color Vision. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 221p
Supersedes PB80-803992, and NTIS/PS-79/0049.

Selected references are presented on defective color vision, genetic characteristics, tests for color blindness, and the use of optical filters in enhancing color images. Reports are included on human engineering for military personnel, pilots, and other operators. Color vision requirements for various occupations are discussed. (This updated bibliography contains 212 citations, 17 of which are new entries to the previous edition.)

PB81-858060 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Immune Response Ontogony T and B Lymphocytes. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
Rept. for Jan 78-Nov 80.
Jan 81, 67p NERACIRLNT2919

This retrospective bibliography contains citations concerning the development of B and T lymphocytes in the thymus, spleen and bone marrow. The function of these cells is also discussed, ie, the development of cellular and humoral immunity. (Contains 55 citations, fully indexed and including a table of contents.)

6Q. Protective Equipment

AD-A094 898/4 PC **A03**/MF **A01**
School of Aerospace Medicine, Brooks AFB, TX.
Evaluation of PLZT Goggles.
Final rept. Jun 78-Apr 79,
Everett O. Richey, James L. Bower, and Ralph G. Allen. Dec 80, 40p Rept no. SAM-TR-80-17

Air Force Prototype Thermal Flash Protective Device (TFPD) Goggles were furnished to USAFSAM by the Life Support System Program Office, Aeronautical Systems Division, for determination and evaluation of their eye-type goggles caused stressed areas. The bonding used in the production model eliminated the stressed areas, resulting in increased closed-state optical density, particularly in the upper nasal area of the lens.

N81-16740/5 PC **A02**/MF **A01**
Acurex Corp./Aerotherm, Mountain View, CA. Aerospace Systems Div.
Further Study for Fabrication, Evaluation, and Testing of Monolayer Woven Materials for Space Suit Insulation.
Final Report.
R. Short. Sep 80, 12p NASA-CR-166140, ACUREX-TR-80-31/AS
Contracts NAS2-10542, ACUREX PROJ. 6246

Improvements to the monolayer woven pile concept were evaluated in terms of increased durability and thermal performance. Three varieties of the monolayer material were tested for thermal conductance under various conditions simulating those which occur in space. In addition, the tendency of the pile to unravel was subjectively evaluated.

N81-16741/3 PC **A05**/MF **A01**
Vought Corp., Dallas, TX.
Development and Fabrication of an Advanced Liquid Cooling Garment.
Final Report.
C. W. Hixon. 6 Mar 78, 87p NASA-CR-152101, REPT-2-53200/8R-3462
Contract NAS2-9026

A tube/fin concept liquid cooling garment head cooler was developed, fabricated and delivered to NASA-ARC. The head cooler was fabricated from polyurethane film which sandwiches the transport fluid tubing and a thermally conductive fin material. The head cooler garment is sewn to form a skull cap and covered with a comfort liner. In addition, two Neonate heating garments were fabricated and supplied to NASA for further finishing and use in medical tests. The resulting garment is flexible, elastic and conforms to the head comfortably. Tests on a tube/fin element of identical construction as the head cooler demonstrated good thermal effectiveness. Use of commercially available materials and development of relatively simple fabrication techniques give the potential for a low garment cost.

PAT-APPL-6-101 368 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Flash Protection Controller.
Patent Application,
L. K. Galbraith. Filed 7 Dec 79, 19p
Contract AT(29-1)-789
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A controller provides a high voltage to maintain an electro-optic shutter in a transparent condition until a flash of light which would be harmful to personnel is sensed by a phototransistor. The controller then shorts the shutter to ground to minimize light transmission to the user and maintains light transmission at the pre-flash level for a predetermined time to allow the flash to subside. A log converter and differential trigger circuit keep the controller from being triggered by other light flashes which are not dangerous. (ERA citation 06:005172)

6R. Radiobiology

AD-A094 645/9 PC **A02**/MF **A01**
Walter Reed Army Inst. of Research, Washington, DC.
Differing Effects of Pulsed and CW Microwave Energy upon Nerve Function as Detected by Birefringence Measurement,
Peter V. K. Brown, and Lawrence E. Larsen. 11 Mar 80, 10p
Pub. in IEEE Transactions on Microwave Theory and Techniques, vMTT-28 n10 p1126-1133 Oct 80.

No abstract available.

AD-A094 788/7 PC **A02**/MF **A01**
Colorado Univ. at Boulder. Nuclear Physics Lab.
Microwave Effects on Learning and Memory in Mice.
Final rept.,
M. W. Luttges. 30 Sep 80, 25p AFOSR-TR-81-0091
Grant AFOSR-80-0036

The effects of microwave irradiation were assessed on learning memory in mice. Also, preliminary studies were completed to begin an assessment of underlying physiological mechanisms related to the observed microwave effects on behavior. Using a resonant microwave irradiation chamber in which mice were exposed following daily training to 3GHz pulsed microwave at approximately 18rn W/sq cm average power levels, small but reliable increases in performance were documented. All treatments were delivered posttrial for a 15 min. period. Sham-treated mice were treated in the same manner as exposed mice except that no radiation was delivered. Repeated replications with different aged animals produced the same effects. The microwave facilitation was observed in both automated active avoidance testing and in single-trial, passive avoidance testing. The modest facilitation effect was observed when the mice were tested at 20 days after original training. Using a different irradiation chamber, the studies were repeated. The new chamber used an impedance matched horn in which the mice were restrained in a constant orientation relative to the microwave fields. In this test configuration the mice received an average power level of 22mW/sq cm. Once again, small but reliable amounts of performance facilitation were observed.

AD-A094 889/3 PC **A02**/MF **A01**
University of Western Ontario, London. Dept. of Biochemistry.
Microwave and Temperature Effects on the Murine Ocular Lens in Vitro.
Annual summary rept. 1 Sep 79-30 May 80,
John R. Trevithick. Jun 80, 23p
Grants DAMD17-78-G-9449, PHS-EY-1927

Rat ocular lenses were studied after fixation and critical point drying of the tissue by scanning electron microscopy (SEM) following exposures to elevated temperatures and/or microwave irradiation in a thermostatically controlled chamber. In this way, the temperature of the lens bathing medium was set independently of the temperature increases normally associated with application of microwave power. Irradiations were done at three final temperatures and three specific absorption rates (SAR) for two durations. These were accomplished at 915 MHz in WR975 waveguide with either pulsed (Pu) or continuous wave (CW9 radiation of equal average power. The parameters of the (Pu) radiation were selected to maximize the production of thermoacoustic expansion. The results are summarized as follows: (1) Exposure of lenses in vitro to elevated temperatures for 1 hour followed by a 2-day incubation in tissue culture medium 199 (M199) produced predominantly subcapsular and epithelial defects at 39 C, while at 41 C, extensive globular degeneration was added. (2) Microwave pulsed irradiation in vitro at 37 C followed by a 2-day incubation in M199 produced globular bodies and subcapsular foam at the lowest SAR (120 mW/g) and shortest duration (5 min). At the intermediate SAR (400 mW/g) and 5 minute duration, holes in the lens fibers were added. (3) Microwave irradiation at 39 C and 41 C followed by a 2-day incubation in M199 caused more damage at all SARs and durations than at 37 C. (4) Fixation of the lenses without incubation did not reveal any defect in the sham irradiated control at 39 C. (5) At a given temperature, increased duration appeared to substitute for lower SAR.

AD-A094 959/4 Not available NTIS
Virginia Commonwealth Univ., Richmond. Dept. of Biophysics.
Studies of Exposure of Rabbits to Electromagnetic Pulsed Fields,
S. F. Cleary, F. Nickless, L. M. Liu, and R. Hoffman. 18 Jan 80, 8p
Contract N00014-75-C-0344
Availability: Pub. in Bioelectromagnetics v1 p345-352 1980 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A095 162/4 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Ocular Hazard of Short Pulse Argon Laser Irradiation.
Final rept.,
David J. Lund, and Edwin S. Beatrice. 29 Aug 77, 7p Rept no. LAIR-79-35
Pub. in Health Physics, v36 p7-11 Jan 79.

No abstract available.

DOE/AL/10752-3 PC **A10**/MF **A01**
New Mexico Health and Environment Dept., Santa Fe. Environmental Improvement Div.
Radiological Health Review of the Draft Environmental Impact Statement (DOE/EIS-0026-D) Waste Isolation Pilot Plant, US Department of Energy. Report EEG-3.
R. H. Neill, J. K. Channell, C. Wofsy, and M. A. Greenfield. Aug 79, 219p
Contract AC04-78AL10752

This review of radiological health considerations contains a number of concerns, questions and recommendations that should be addressed by the Department of Energy in the final Environmental Impact Statement (EIS) for the Waste Isolation Pilot Plant (WIPP). Using the assumptions contained in the Draft Environmental Impact Statement (DEIS), the Environmental Evaluation Group (EEG) calculated a number of radiation doses and the results were found to be in general agreement with those presented in the DEIS. The doses resulting from the operational and long-range releases from WIPP to the general population are no more than a fraction of existing radiation doses to the public. However, there are a number of technical considerations in the assessment of radiation exposure that were not adequately evaluated in the DEIS. They are discussed in this review. A number of additional dosage estimates have been identified that need to be calculated by both DOE and EEG. As the DEIS did not contain estimates of the amounts of radioactivity to be permanently located in the repository, it was necessary to calculate these amounts. Health effects, transportation, waste acceptance criteria, site evaluation, site selection criteria, operational exposure, the experimental waste program, long term radiation releases, retrievability, and decommissioning are the categories of the DEIS which were evaluated. (ERA citation 06:005843)

DOE/EV/04322-2 PC **A02**/MF **A01**
Harvard School of Public Health, Boston, MA.
Comprehensive Progress Report.
J. B. Little. 1 Jul 80, 10p
Contract AS02-77EV04322

The goal of this research project during the past three years has been to characterize the effects of alpha radiation in the induction of malignant transformation in vitro. A exp 238 PuO sub 2 source was constructed and mounted in a specially designed chamber which allowed uniform alpha particle irradiation of monolayer cultures in 100 mm plastic Petri dishes at a dose-rate of 24 rads/min. The biologic effects were compared with those observed with 220 Kv x-rays. The induction of sister chromatid exchanges (SCE) and gross chromosomal aberrations by alpha radiation was studied in parallel experiments. The maximally effective dose for the induction of SCE by alpha particles was about 5% of that required for x-rays, though the actual frequencies induced were somewhat lower. As in the case of survival and transformation, no decline occurred in the level of chromosome aberrations in alpha-irradiated cells when they were held in the stationary phase of growth after exposure. Finally, preliminary experiments have been initiated to study transformation induced by incorporated radioisotopes of varying LET. exp 125 IudR, which emits densely ionizing Auger electrons, appears to be several-fold more effective per decay than exp 3 H-thymidine. These results generally confirm those obtained for external alpha irradiation. (ERA citation 06:006636)

IAEA-TECDOC-225 PC **A06**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
Planning for off-Site Response to Radiation Accidents in Nuclear Facilities. A Document Deriving from Advisory Group Meetings on Planning for the Protection of the Public in the Event of an Accident in a Nuclear Facility, Organized by the IAEA and Held in Ankara, Turkey, 15-19 November 1976 and in Lisbon, Portugal, 24-28 October 1977.
1979, 115p
U.S. Sales Only.

The purpose of this manual is to give guidance to those who are responsible for the protection of the public in the event of an accident occurring at a land-based nuclear facility. This guidance should assist in the advance preparation of emergency response plans and implementing procedures. Basic principles of protective measures along with their advantages and disadvantages are discussed. Other principles related to emergency planning and the operational response to an emergency are outlined. Although the guidance is primarily oriented toward land-based nuclear power facilities, the guidance does have general application to other types of nuclear facilities. (Atomindex citation 11:531386)

LA-8584-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Radiation Detectors as Surveillance Monitors for IAEA Safeguards.
P. E. Fehlau, and E. J. Dowdy. Oct 80, 31p
Contract W-7405-ENG-36

Radiation detectors used for personnel dosimetry are examined for use under IAEA Safeguards as monitors to confirm the passage or nonpassage (YES/NO) of plutonium-bearing nuclear material at barrier penetrations declared closed. In this application where backgrounds are ill defined, no advantage is found for a particular detector type because of intrinsic efficiency. Secondary considerations such as complexity, ease of tamper-proofing, and ease of readout are used to recommend specific detector types for routine monitoring and for data-base measurements. Recommendations are made for applications, data acquisition, and instrument development. (ERA citation 06:005850)

LBL-11147 PC **A08**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Theoretical and Observational Analysis of Individual Ionizing Particle Effects in Biological Tissue.
A. C. Nelson. Nov 80, 164p
Contract W-7405-ENG-48
Thesis.

The microstructural damage to living tissue caused by heavy ion radiation was studied. Preliminary tests on rat corneal tissue, rat cerebellar tissue grown in culture, and rat retinal tissue indicated that the best assay for heavy ion damage is the rat cornea. The corneal tissue of the living rat was exposed to beams of carbon at 474 MeV/amu, neon at 8.5 MeV/amu, argon at 8.5 MeV/amu, silicon at 530 MeV/amu, iron at 500 MeV/amu, and iron at 600 MeV/amu. X-rays were also used on corneas to compare with the heavy ion irradiated corneas. Scanning electron microscopy revealed lesions with circular symmetry on the external plasma membranes of corneal epithelium which were irradiated with heavy ions, but similar lesions were not observed on the plasma membranes of x-ray irradiated or non-irradiated control samples. These data verify the special way in which heavy ions interact with matter: each ion interacts coulombically with electrons all along its trajectory to generate a track. The dose from heavy ion radiation is not distributed homogeneously on a tissue microstructural scale but is concentrated along the individual particle track. Even along a single particle track the dose is discontinuous except at the Bragg peak when the LET is maximum. Micrographs of heavy-ion-irradiated corneas demonstrated two significant correlations with the heavy ion beam: (1) the number of plasma membrane lesions per unit area was correlated with the particle fluence, and (2) the diameter of the lesions were linearly related to the energy loss or LET of the individual particle. These observations corroborate what has already been suggested theoretically about heavy ion tracks and what has been shown experimentally. But the new data indicate that particle tracks occur in biological tissues as well, and that a single heavy ion is responsible for each membrane lesion. (ERA citation 06:008238)

LBL-11297 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Health Effects of the Nuclear Accident at Three Mile Island.
J. I. Fabrikant. May 80, 24p CONF-8005125-1
Contract W-7405-ENG-48
Conference on environmental regulation of the nuclear industry: a new decade, San Francisco, CA, USA, 18 May 1980.

Between March 28 and April 15, 1979 the collective dose resulting from the radioactivity released to the population living within a 50-mile radius of the Three Mile Island nuclear plant was about 2000 person-rems, less than 1% of the annual natural background level. The average dose to a person living within 5 miles of the nuclear plant was less than 10% of annual background radiation. The maximum estimated radiation dose received by any one individual in the general population (excluding the nuclear plant workers) during the accident was 70 mrem. The doses received by the general population as a result of the accident were so small that there will be no detectable additional cases of cancer, developmental abnormalities, or genetic ill-health. Three Three Mile Island nuclear workers received radiation doses of about 3 to 4 rem, exceeding maximum permissible quarterly dose of 3 rem. The major health effect of the accident at Three Mile Island was that of a pronounced demoralizing effect on the general population in the Three Mile Island area, including teenagers and mothers of preschool children and the nuclear plant workers. However, this effect proved transient in all groups studied except the nuclear workers. (ERA citation 06:007762)

LBL-9866 PC **A04**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Ionizing Radiation Risks to Satellite Power Systems (SPS) Workers.
Nov 80, 59p
Contract W-7405-ENG-48

The radiation risks to the health of workers who will construct and maintain solar power satellites in the space environment were examined. For ionizing radiation, the major concern will be late or delayed health effects, particularly the increased risk of radiation-induced cancer. The estimated lifetime risk for cancer is 0.8 to 5.0 excess deaths per 10,000 workers per rad of exposure. Thus, for example, in 10,000 workers who completed ten missions with an exposure of 40 rem per mission, 320 to 2000 additional deaths in excess of the 1640 deaths from normally occurring cancer, would be expected. These estimates would indicate a 20 to 120% increase in cancer deaths in the worker-population. The wide range in these estimates stems from the choice of the risk-projection model and the dose-response relationsip. The choice between a linear and a linear-quadratic dose-response model may alter the risk estimate by a factor of about two. The method of analysis (e.g., relative vs absolute risk model) can alter the risk estimate by an additional factor of three. Choosing different age and sex distributions can further change the estimate by another factor of up to three. The potential genetic consequences could be of significance, but at the present time, sufficient information on the age and sex distribution of the worker population is lacking for precise estimation of risk. The potential teratogenic consequences resulting from radiation are considered significant. Radiation exposure of a pregnant worker could result in developmental abnormalities. (ERA citation 06:008237)

LUNFD6/NERA-1009 PC **A02**/MF **A01**
Lund Univ. (Sweden).
In Vivo X-Ray Fluorescence Analysis.
L. Ahlgren. Feb 80, 20p LUMEDM/MERI-1009
Thesis.
U.S. Sales Only.

Measurements on five occupationally exposed persons have shown that it is possible to use X-ray fluorescence analysis for in vivo measurements of lead in the skeleton. The technique for calibrating in vivo X-ray fluorescence measurements of lead in bone tissue has been studied in detail and a two-component phantom simulating the bone and the soft tissue parts of the finger constructed. The technique has been used for in vivo measurements on 22 occupationally exposed persons. The minimum detectable concentration of lead in fingerbones was found to be around 20 mu g x g exp -1 . The lead concentrations in their skeletons and blood were compared: the correlation was poor. The variations in lead concentrations in the skeleton have been studied in occupationally exposed persons and in samples from archaeological skeletons. The sensitivity and the minimum detectable concentration of cadmium in the kidney cortex in in vivo measurements has been studied by measurements on kidney models. The minimum detectable concentration was 20 mu g x g exp -1 at a skin-kidney distance of 30 mm and 40 mu g x g exp -1 at 40 mm. Five persons occupationally exposed were studied. (Atomindex citation 11:549364)

N81-16730/6 PC **A05**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Dosimetric Investigations of Cosmic Radiation Aboard the Kosmos-936 Aes (Joint Soviet-American Experiment K-206).
E. V. Benton, Y. Y. Kovalyev, and V. Y. Dudkin.
Apr 80, 90p NASA-TM-75772
Contract NASW-3199
Transl. Into English of "Dozimetricheskiye Issledovaniya Kosmicheskikh Izluchenly NA Bortu Isz Kosmos-936 (Sovmestnyy Sovetsko-Amerikanskiy Eksperiment K-206)" Moscow, 1979 124 p. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Inst. Of Midico-Biological Problems, Ministry of Health, Moscow.

The Soviet and American parts of the experiment are described separately. Particular attention was given to the following problems: placement of the detectors; study of neutron radiation within the biosatellite; and studies of fragmentation of heavy nuclei on accelerators. Unified methods were developed for the calibration of Soviet and American detectors.

ORNL/TM-6495 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Comparison of the COMRADEX-IV and AIRDOS-EPA Methodologies for Estimating the Radiation Dose to Man from Radionuclide Releases to the Atmosphere.
C. W. Miller, F. O. Hoffman, and D. E. Dunning, Jr. Jan 81, 42p
Contract W-7405-ENG-26

This report presents a comparison between two computerized methodologies for estimating the radiation dose to man from radionuclide releases to the atmosphere. The COMRADEX-IV code was designed to provide a means of assessing potential radiological consequences from postulated power reactor accidents. The AIRDOS-EPA code was developed primarily to assess routine radionuclide releases from nuclear facilities. Although a number of different calculations are performed by these codes, three calculations are in common - atmospheric dispersion, estimation of internal dose from inhalation, and estimation of external dose from immersion in air containing gamma emitting radionuclides. The models used in these calculations were examined and found, in general, to be the same. Most differences in the doses calculated by the two codes are due to differences in values chosen for input parameters and not due to model differences. A sample problem is presented for illustration. (ERA citation 06:005847)

PAT-APPL-6-100 665 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Tissue Implantation Method and Apparatus.
Patent Application,
J. D. Doss. Filed 5 Dec 79, 9p
Contract W-7405-ENG-36
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The disclosure describes the implantation of seeds of radioactive material into body tissue utilizing a cannula and anchor containing suture. (ERA citation 06:005347)

PB81-803843 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA
Biological Effects of Laser Radiation. January, 1978-February, 1981 (Citations from the NTIS Data Base).
Rept. for Jan 78-Feb 81.
Feb 81, 69p
Supersedes PB80-803935, and NTIS/PS-79/0020. See also 1964-January, 1978, NTIS/PS-79/0019.

The bibliography cites reports on radiation injuries, permissible dosage, protective devices, and safety measures. Included are references on the pathology of eye lesions caused by lasers. (This updated bibliography contains 60 citations, 21 of which are new entries to the previous edition.)

SIS-1979-2(Rev.) PC **A06**/MF **A01**
Statens Inst. for Straalehygiene, Oslo (Norway).
Population Doses from Naturally Occurring Radiation in Norway.
E. Stranden. 116p
U.S. Sales Only.

The main purpose of this work was to study the radiological consequences of the introduction of building materials with high concentrations of radioactivity and to analyse the impact of a reduction of the ventilation rates in houses on the population dose from inhalation of natural airborne radioactivity. The general problems of radioactivity in building materials are discussed. Measurements of radioactivity in building materials from different parts of the country are reported, together with theoretical calculations of the gamma doses in houses. These calculations are compared with experimental results and earlier measurements of the indoor gamma radiation in Norway. Measurements of the outdoor gamma radiation in different parts of Norway are presented. These results are used together with earlier measurements of the gamma radiation inside houses to calculate the average, and variations of population dose from this radiation. An experimental study on the radon concentrations inside different types of dwellings, and a discussion of the respiratory dose received by the inhalation of radon daughters is presented. Some factors that may have influence upon the radon concentrations are also discussed. A method for measurement of radon and thoron daughters in air is discussed. The possible radiological effects of an increased radon concentration in houses are discussed. (Atomindex citation 11:546783)

SNV-PM-1173 PC **A02**/MF **A01**
National Swedish Environment Protection Board, Stockholm.
Biological and Radioecological Investigations at the Nuclear Power Plant of Oskarshamn at Simpvarp, 1962-1978.
U. Grimaas, and E. Neuman. Jun 79, 17p
In Swedish.
U.S. Sales Only.

The effect of the cooling water on the biological system and the uptake/enrichment of radionuclides in sediments and living systems have been investigated at the Oskarshamns plant at the Baltic. The directions which the cooling water takes and the topography of the region makes it natural to divide the region into four effective zones. In zone 1, namely in the plant and in the cooling channels, the destruction of fish, the loss of planktons and the development of clinging systems, mainly balanidae, takes place. In zone 2, 0.1 km exp 2 , in the bay of discharge, the effects are evident on all levels of the ecological systems. The balance is changed and the favoured species of biologic substances increase. There is a larger turnover of organic materials. In zone 3 which is the sea region outside the bay, 20 - 25 km exp 2 effects can be shown in different parts of the ecosystems. The effects are pronounced along the coast to the south. The small herring is attracted to the bay of discharge, and it spawns earlier than usual. There is no effect on eels. In the large area, zone 4, 20 kg to the south and 7 km to the north the effects are shaded by natural variations. Small amounts of radionuclides are detected in the sediments of this large region. The radionuclide enrichment is highest in the vegetation, and smallest in the fish. The assumed factors of enrichment have been very conservative, and the real values for the fish are 10 to 100 times lower. (Atomindex citation 11:546754)

6S. Stress Physiology

AD-A094 623/6 PC **A02**/MF **A01**
Air Force Aerospace Medical Research Lab., Wright-Patterson AFB, OH.
Radioactive Microsphere Study of Cerebral Blood Flow under Acceleration.
Technical rept.,
Kevin J. Greenlees, James E. Yoder, David M. Toth, Clarence M. Oloff, and Alva Karl. Nov 80, 13p Rept no. AFAMRL-TR-80-50

A study using radioactive microspheres for the investigation of cerebral blood flow during acceleration is described. Details of a technique for the blunt dissection of cerebral tissues are included. Results of flow studies at 3 and 5 G sub z acceleration stress indicate there is no selective regional preservation of cerebral tissue. (Author)

AD-A094 676/4 PC **A05**/MF **A01**
Federation of American Societies for Experimental Biology, Bethesda, MD.
Symposium on Underwater Physiology (7th), July 5-10, 1980, Athens, Greece.
Final rept. 1 Aug 78-31 Oct 80,
Arthur J. Bachrach. 10 Jul 80, 98p
Grant N00014-78-G-0041

The Program featured state-of-the-art reviews by eminent authorities, followed by shorter research papers selected by the Symposium Governing Board from submitted mini-papers. In response to the Call for Papers, more than 100 contributions were received, of which 46 were selected for oral

presentations in symposia and 37 were programmed as poster presentations. Symposia included the following topics: Oxygen Toxicity, Oxygen Sufficiency and Utilization within the Cell, Metabolism and Thermal Physiology, Molecular and Cellular Effects of Hydrostatic Pressure, High Pressure Nervous Syndrome, Cardio-Respiratory Responses to Exercise, Inert Gas Exchange and Decompression, Health Hazards. Attendance for the Symposium was gratifying, with a total of 298 registrants representing 25 countries. The majority (65%) were from countries other than the U.S.A. (Author)

AD-A094 792/9 PC **A04**/MF **A01**
Kentucky Univ., Lexington. Wenner-Gren Research Lab.
Response of the Cardiovascular System to Vibration and Combined Stresses.
Interim progress rept. 1 Oct 79-30 Sep 80,
C. F. Knapp, J. M. Evans, and D. R. Randall. Nov 80, 59p AFOSR-TR-81-0083
Grant AFOSR-80-0039

Studies of the previous year indicated an inability of cardiac denervated dogs to maintain stroke volume during the positive g sub z portion of sinusoidal plus or minus 2 g sub z acceleration stress across the frequency range of 0.004 to 0.25 Hz. To investigate the inadequacy of stroke volume maintenance in these chronically instrumented animals, three cardiac dimensions have been added to provide heart volume information in addition to our standard instrumentation for measuring aortic flow and left and right ventricular and aortic arch pressures. To date, crystals have been implanted to record heart size in 27 animals (16 normal and 11 cardiac denervated) whose body weights ranged from 17 to 26 kg.

AD-A094 804/2 PC **A02**/MF **A01**
Saint Louis Univ., MO. School of Medicine.
The Investigation of Metabolic and Cardiovascular Responses to Fatiguing Static Effort.
Final rept.,
A. R. Lind, J. S. Petrofsky, C. A. Williams, T. E. Dahms, and G. Kamen. 27 Aug 80, 22p AFOSR-TR-81-0085
Grant AFOSR-76-3084
See also AD-A037 975.

In the animal experiments a new method of stimulating muscles was developed in the laboratory to mimic voluntary contractions. Cat muscles were stimulated to fatigue at various constant tensions. The soleus muscle (slow twitch) did not fatigue unless the tension exceeded 30% of maximal strength whereas the plantaris muscle (fast-twitch) fatigued at all tensions above 3% of maximal strength. Fatigue was not attributable to failure of the neuromuscular junction. Fatiguing contractions of the soleus muscle did not elicit an increase in blood pressure whereas fast-twitch muscles did so, just as in voluntary contractions in man. In human studies, women held given fractions of maximal strength longer than men. But because men are stronger than women, transposing the same data into absolute tension shows that the men have a longer isometric endurance for any given tension examined. Electromyographic studies show that the integrated amplitude increases as contractions are held to fatigue by about the same amount, irrespective of the tension held. The frequency of the electromyogram fell by an absolute amount all tensions. This kind of analysis may be used as a tool to detect fatigue. Extensive studies of the control of muscle blood flow showed that during intermittent isometric exercise, local metabolites were responsible for dilating the vessels but that that effect could be opposed, in part, by neural vasoconstriction. (Author)

AD-A094 822/4 PC **A02**/MF **A01**
School of Aerospace Medicine, Brooks AFB, TX.
Mission Crew Fatigue during RIVET JOINT Block II Demonstration/Evaluation.
Final rept. Jan 77-Feb 80,
William F. Storm. Nov 80, 20p Rept no. SAM-TR-80-37

RIVET JOINT is a USAF Electronic Systems Command (ESC) airborne (RC-135) reconnaissance system. The objectives of an ongoing modernization program are to improve mission capability and manpower utilizaiton through use of state-of-the-art computer technology and surveillance equipment. A prototype modernized system recently underwent testing and evaluation in the real-world operational environment. ESC/SD requested that the USAF School of Aerospace Medicine (USAF-SAM/VN) evaluate the impact of the system on operator stress and fatique. Psychobiological data were systematically collected from 13 operators over 6 consecutive days, including two 8-hour airborne test missions. The subjective fatigue and physiological cost associated with the test missions were moderate and did not suggest compromises in performance and safety. The operators were fully recovered from each of the test missions after an extended postmission night of sleep. (Author)

AD-A094 837/2 PC **A04**/MF **A01**
School of Aerospace Medicine, Brooks AFB, TX.
Forty-Eight Versus Twenty-Four Hour Duty for USAF Missile Crews: A Feasibility Study Using Subjective Measures of Fatigue.
Final rept. Aug 78-Mar 80,
Stephen F. Gray. Nov 80, 58p Rept no. SAM-TR-80-39

The purpose of this study was to assess the feasibility of implementing a 48-hour work schedule for missile launch crews of a United States Air Force operational missile wing. A 90-day field test using two operational Minuteman missile squadrons as test and control groups was accomplished during the winter of 1978-1979 at Grand Forks Air Force Base, North Dakota. Subjective reports of fatigue and the quantity and quality of sleep were recorded daily by crew members during work and while they were off duty. In addition, subjective reports of workload and disruptions of sleep were gathered during alerts. Subsets of data from at most 10 distributed alerts for each crew member were subjected to analyses of variance. The primary analyses were tests for differences between the responses of crew members working a new 48-hour vs. those working the standard 24-hour schedule. Scaled subjective reports of fatigue at the end of alert, after driving back to base, and after 24 hours of recovery indicated no significant differences between the two work schedules. Tests for interactions of the work schedules with activities during alerts, specific control centers, and cumulative or maturational effects over several alerts showed no effects that might have masked real differences between the work schedules. In conclusion, a recommendation was made that the 48-hour work schedule was feasible under the specific circumstances used in this study.

AD-A094 839/8 PC **A02**/MF **A01**
School of Aerospace Medicine, Brooks AFB, TX.
E-4B Crew Fatigue Associated with 30-Hour IOT&E Mission.
Final rept. 1 Feb 78-31 Mar 80,
William F. Storm. Oct 80, 23p Rept no. SAM-TR-80-40

The Air Force Test and Evaluation Center (AFTEC) conducted an independent 45-day IOT&E of the Advanced Airborne Command Post (E-4B aircraft) system from 27 December 1978 to 11 February 1979. A 30-hour continuously airborne mission was flown 6-7 February 1979 to demonstrate the extended mission capability of the E-4B system. Using a battery of psychobiological measures, the Crew Technology Division of the USAF School of Aerospace Medicine (USAFSAM/VN) evaluated crew fatigue associated with the extended mission. The battery consisted of sleep surveys, subjective fatigue ratings, and mood surveys, as well as endocrine/metabolic indices derived from urine samples. Data were systematically collected from 66 crewmen at 4-hour intervals during the mission and for 3 1/2 days after the mission. The data were reduced for six functional crew groups: flight-crew, stewards, radio operators, radio maintenance technicians, aircraft maintenance technicians, and the National Emergency Airborne Command Post (NEACP) battle staff. Fatigue and stress levels that occurred during the 30-hour mission were moderate and not suggestive of compromises in performance and safety. Fragmented sleep acquired in the bunks and passenger seats was of restorative value and contributed to the abeyance of severe fatigue and negative mood states during the mission. Severe levels of subjective fatigue were reported a few hours after mission completion, but after 2 nights of uninterrupted sleep in the home environment, the crews were sufficiently recovered to resume normal ground and flight duties. (Author)

AD-A094 876/0 PC **A02**/MF **A01**
Air Force Aerospace Medical Research Lab., Wright-Patterson AFB, OH.
Effect of Body Supination Angle on Subjective Response to Whole-Body Vibration,
Cariold B. Harrah, and Richard W. Shoenberger. 1980, 7p Rept no. AFAMRL-TR-80-83
Pub. in Aviation, Space, and Environmental Medicine, v52 n1 p28-32 Jan 81.

No abstract available.

AD-A094 911/5 PC **A02**/MF **A01**
Letterman Army Inst. of Research, San Francisco, CA.
Chromatic Strobe Flash Disruption of Pursuit Tracking Performance.
Final rept. Feb-Apr 80,
Peter A. O'Mara, David A. Stamper, David J. Lund, and Edwin S. Beatrice. Nov 80, 23p Rept no. LAIR-88

Ten men used a viscous-damped mount optical tracking system during a study of the effects of strobe flashes and ambient lighting on pursuit tracking performance. The volunteers tracked a 0.5 mrad target moving to the left or right for 15 s at a constant angular velocity of 5.0 mrad/s. A single 170 micron 0.053 sr, 538 nm strobe flash was presented at random at the rate of one flash for each five trials. The flashes produced significant increases in the standard deviations of the horizontal and vertical aiming errors under both ambient light conditions. The average maximum aiming error was 0.6 mrad during bright ambient light trials. Approximately 2 s were required to return to normal control error rates. Flashes presented during the low ambient lighting conditions produced off-scale errors (>2 mrad). Recovery times averaged 6 s for a 1 mrad target and 3 s for a 4 mrad target. This study used large retinal area strobe flashes that were an order of magnitude below permissible safe exposure levels and much lower than levels produced by military laser devices. In spite of this limitation, single 538 nm flashes produced significant disruptions of pursuit tracking performance even though the behavior of the target was predictable. The magnitude of these effects will be much greater for more intense single or multiple flashes and for targets which are engaged in unpredictable maneuvers.

AD-A094 960/2 Not available NTIS
Toronto Univ. (Ontario). Dept. of Otolaryngology.
Pathophysiology of Inner Ear Dysfunction in the Squirrel Monkey in Rapid Decompression,
Jack P. Landolt, Kenneth E. Money, E. D. L. Topliff, A. D. Nicholas, and Jerry Laufer. 29 Feb 80, 13p DCIEM-RP-80P10
Grant N00014-77-G-0077
Availability: Pub. in Jnl. of Applied Physiology, v49 n6 p1070-1082 1980 (No copies furnished by DTIC/NTIS).

No abstract available.

N81-16719/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Hemorheological Changes, the State of Microcirculation, and Blood Acid-Base Balance in Rats under Conditions of a 30-Day Limiting of the Motor Activity.
Y. M. Shtykhno, and V. I. Udovichenko. Dec 80, 8p NASA-TM-76464
Contract NASW-3198
Transl. Into English from Vestn. Akad. Med. Nauk, SSSR (USSR), No. 2, 1978 p 68-71. Transl. By Scientific Translation Service, Santa Barbara, Calif. Original DOC. Prep. By Inst. Of General Pathology and Pathological Physiology of the Akademii Meditsinskikh Nauk, Moscow.

Changes were expressed in reduction in number of true capillaries, the appearance of nonfunctioning empty vessels and in the opening of the arteriolovenular shunts. Changes in the acid-base balance in the direction of reduction of buffer blood content were also noted.

N81-16722/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Antibodies to Myofibril Antigens in Cosmonauts after Spaceflights.
R. Y. Tashpulatov, T. A. Danilova, A. T. Lesnyak, V. I. Legenkov, and V. S. Znamenskiy. Aug 80, 8p NASA-TM-76300
Contract NASW-3199
Transl. Into English from Zh. Mikrobiol. Epidemiol. Immunobiol. (USSR), No. 12, Dec. 1979 p 36-39. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Moscow Gamalei Inst. For Epidemiology and Microbiol.

Serum samples obtained from 15 astronauts before and after spaceflights were studied with the use of the indirect immunofluorescent method. In seven astronauts antibodies to different elements of the human heart muscle appeared after flights. Strong and very strong luminescence of the elements of heart muscle tissue was detected in the astronauts after the third space flight. In a study of the sera on sections of bovine heart muscle tissue the reactions of the sera taken before and after flight were found to show no essential differences.

N81-16723/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Ways of Increasing Muscular Activity by Means of Isometric Muscular Exertion.
A. V. Kovalik. Aug 80, 9p NASA-TM-76307
Contract NASW-3199
Transl. Into English from Teor. I Prakt. Fizicheskoy Kultury (USSR), No. 12, Dec. 1979 p 38-40. Transl. By Kanner (Leo) Associated, Redwood City, Calif. Original DOC. Prep. By Penza Factory Higher to Technical Inst., USSR.

The effect of isometric muscular exertion on the human body was investigated by having subjects perform basic movements in a sitting position in the conventional manner with additional muscle tension at 50% maximum force and at maximum force. The pulse, arterial pressure, skin temperature, respiratory rate, minute respiratory volume and electrical activity of the muscles involved were all measured. Performance of the exercises with maximum muscular exertion for 20 sec and without movement resulted in the greatest shifts in these indices; in the conventional manner substantial changes did not occur; and with isometric muscular exertion with 50% maximum force with and without movement, optimal functional shifts resulted. The latter is recommended for use in industrial exercises for the prevention of hypodynamia. Ten exercises are suggested.

N81-16729/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Orthostatic Hypotension.
J. J. Grimm. Dec 80, 11p NASA-TM-75433
Contract NASW-3199
Transl. Into English of Rev. Suisse de Medecine (Switzerland), 69, No. 16, 1980 p 518-521. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Univ. Med. Policlinic, Lausanne, Switzerland.

Following a brief physiopathological review, orthostatic hypotension is classified into three groups: organic, functional and medication-dependent. The importance of etiological diagnosis, the use of objective tests and appropriate therapy, especially concerning the organic forms, is stressed.

PB81-803876 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Effects of Fatigue on Human Behavior and Performance. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 246p
Supersedes PB80-804263, and NTIS/PS-79/0071.

The bibliography cites references on the psychological and physiological effects of mental and physical fatigue. Reports on circadian rhythm, work - rest schedules, sleep deprivation, and physical endurance are included. (This updated bibliography contains 237 citations, 39 of which are new entries to the previous edition.)

6T. Toxicology

AD-A094 778/8 PC **A02**/MF **A01**
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
Phase 7, Effect of Dermal Applications of N,N-Diethyl-meta-toluamide (m-Det) on the Embryonic Development of Rabbits, March 1979 - July 1980,
Richard A. Angerhofer, and Maurice H. Weeks. 2 Feb 81, 22p Rept no. USAEHA-75-51-0034-7
See also Phase 8, AD-A092 937.

Daily dermal applications of an ethanol solution of m-Det were administered to pregnant rabbits from day 1 through day 29 of gestation. Dosages were selected as fractions of the dermal LD50 for that species (50, 100, 500 and 1000 mg/kg/day corresponding to 1/100, 1/50, 1/10, and 1/5 of the LD50). Repeated applications of a 75 percent solution of m-Det caused moderate to severe skin irritation in rabbits with the degree of irritation dependent upon the daily dosage. It would be expected to cause irritation to human skin upon repeated applications at high concentrations if the skin is left unwashed. All maternal and fetal indices were within normal limits. The single abortions occurring in each of the highest two dosage groups were presumed to be spontaneous events caused by handling the animals or the discomfort of the skin irritation. M-Det was not shown to be a teratogen in rabbits and would not be expected to cause birth defects in humans. (Author)

AD-A094 846/3 PC **A02**/MF **A01**
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
Topical Hazard Evaluation Program of Candidate Insect Repellent AI3-37443a, US Department of Agriculture Proprietary Chemical, Study, September 1978 - November 1980.
Final rept. Sep 78-Nov 80,
Michael J. Topper, and Maurice H. Weeks. 5 Feb 81, 13p Rept no. USAEHA-75-51-0144-81

Preliminary hazard evaluation of AI3-37443a was performed by means of laboratory animal studies using rats, rabbits, and guinea pigs. The technical grade chemical did not cause skin, eye, or photo irritation. It did not prove to be a skin sensitizer or to be acutely toxic by ingestion. It was recommended that the chemical be approved for further testing as a candidate insect repellent. (Author)

AD-A095 127/7 PC **A02**/MF **A01**
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
Topical Hazard Evaluation Program of Candidate Insect Repellent AI3-37445-a US Department of Agriculture Proprietary Chemical, September 1978 - November 1980.
Final rept. Sep 78-Nov 80,
Maurice H. Weeks, and Michael J. Topper. 11 Feb 81, 13p Rept no. USAEHA-75-51-0146-81

A hazard evaluation of candidate insect repellent AI3-37445-a was performed by means of laboratory studies using rats, rabbits, and guinea pigs. he technical grade compound caused mild eye irritation, but no skin irritation or photochemical irritation in rabbits, no sensitization reactions in guinea pigs and did not demonstrate an acute ingestion hazard. It is recommended that AI3-37445-a, US Department of Agriculture Proprietary Chemical, be approved for further testing as a candidate insect repellent. (Author)

AD-A095 133/5 PC **A02**/MF **A01**
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
Topical Hazard Evaluation Program of Candidate Insect Repellent AI3-20816-a, US Department of Agriculture Proprietary Compound, September 1978-November 1980.
Final rept.,
Maurice H. Weeks, and Michael J. Topper. 11 Feb 81, 14p Rept no. USAEHA-75-51-0148-81

A hazard evaluation of candidate insect repellent AI3-20816-a was performed by means of laboratory studies using rats, rabbits, and guinea pigs. The technical grade compound causes mild skin irritation, but no eye irritation, no photochemical irritation in rabbits, no sensitization reaction in guinea pigs, and did not demonstrate an acute ingestion hazard. However, 25 percent ethanol solutions of AI3-20816 cause moderate skin irritation reactions in rabbits. It is recommended that AI3-20816, USDA Proprietary compound be approved for further testing as a candidate insect repellent. Ethanol solutions may cause some skin irritation in sensitive individuals. (Author)

LA-8654-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Biological Effects of Inhaled TiCl sub 4 /NH sub 4 OH Reaction Products in Sprague-Dawley Rats and Syrian Hamsters.
D. M. Smith, C. J. Pigg, and R. F. Archuleta. Dec 80, 8p
Contract W-7405-ENG-36

Sprague-Dawley rats and Syrian hamsters were exposed for one hour to the reactant products of aerosolized TiCl sub 4 and NH sub 4 OH. Groups of each specie and sex were then immediately anesthetized (Point I) or maintained for 30 days (Point II) and blood samples taken for complete blood counts (CBC's) and clinical chemistry profiles (SMAC-20's). These animals were then sacrificed and complete autopsies were performed. There were no significant differences biologically in any of the CBC or SMAC-20's profile values for the exposed versus control animal groups at either Point I or II. One of the 30 exposed male hamsters (3%) at Point II developed multiple microgranulomas of the lung. (ERA citation 06:008275)

N81-16724/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Pharmacological Activity and Toxicity of Some Neurotropic Agents under Conditions of Experimental Hypodynamia.
L. T. Kirichek. Sep 80, 8p NASA-TM-76371
Contract NASW-3199
Transl. Into English from Farmakol. Toksikol. (USSR), V. 42, No. 3, May - Jun. 1979 p 221-225. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Kharkov Medical Inst. (USSR).

The indices of pharmacological range, risk coefficients, ED50, LD50, the size of the area of toxic activity, and maximal tolerated and absolute lethal doses were compared in hypodynamic mice. The pharmacological activity of the test neurotropic agents exhibiting a central action underwent change, but their toxicity remained unchanged.

N81-16731/4 PC **A05**/MF **A01**
Tennessee Univ., Memphis.
Relative Toxicity Testing of Spacecraft Materials. 1: Spacecraft Materials.
Annual Report, 10 Nov. 1978 - 9 Nov. 1980.
W. H. Lawrence. 6 Nov 80, 83p NASA-CR-160908
Contract NAS9-15670

In chamber thermodegradation procedures were used to access the lethality to rats of the pyrolysis/combustion products of three foams, an adhesive backed metallic tape and RTV silicone rubber adhesive sealant used in spacecraft construction. The role of carbon monoxide in the overall pyrolysate toxicity was also investigated. Post exposure observation of the rats, histological evaluation of selected organs, carbon monoxide concentration in the chamber atmosphere during exposure and the percent carboxyhemoglobin in the animals expiring in the chamber are discussed. Thermogravimetric analysis and dosage response results are given. The lethal effect of the RTV silicon appears to be due to physical obstruction of the respiratory system by particulate matter from pyrolysis.

N81-16732/2 PC **A06**/MF **A01**
Tennessee Univ., Memphis.
Relative Toxicity Testing of Spacecraft Materials. 2: Aircraft Materials.
Annual Report, 10 Nov. 1978 - 9 Nov. 1980.
W. H. Lawrence. 6 Nov 80, 111p NASA-CR-160907
Contract NAS9-15670

The relative toxicity of thermodegradation (pyrolysis/combustion) products of aircraft materials was studied. Two approaches were taken to assess the

biological activity of the pyrolysis/combustion products of these materials: (1) determine the acute lethality to rats from inhalation of these pyrolysates and (2) examine the tendency for sublethal exposure to the pyrolysates to disrupt behavioral (shock avoidance) performance of exposed rats. The ralative importance of lethality vs. behavioral effects in selection of a material may be dictated by whether or not individuals potentially exposed to such products, would have an opportunity to escape if they were behaviorally capable of doing so. If so, the second parameter would assume greater importance, but if not the first parameter may be of much greater importance in selecting materials.

ORNL/EIS-189 PC **A04**/MF **A01**
Environmental Protection Agency, Washington, DC. Office of Pesticides and Toxic Substances.
Proceedings of the Workshop on Subchronic Toxicity Testing.
N. Page, D. Sawhney, and M. G. Ryon. Nov 80, 70p EPA-560/11-80-028
Contract W-7405-ENG-26

Subchronic toxicity procedures are designed to determine the adverse effects that may occur with repeated exposure over a part of the average life span of an experiment animal. The workshop objectives included critically examining the subchronic study as it might be applied to general chemical testing programs and evaluating the effect of variations in study parameters on assessment potential; identifying the deficiencies in the existing scientific knowledge and recommending research to strengthen the testing program; and identifying the related scientific issues to be resolved in future workshops or experimental programs. (ERA citation 06:008276)

PB81-154023 PC **A04**/MF **A01**
Battelle Columbus Toxicology Program Office, Vienna, VA.
Acute Cardiovascular Effects of Aziridinyl Benzoquinone (AZQ) (NSC-182986) Following Continuous Intravenous Infusion to Anesthetized Beaglehounds.
Final rept. 17 Sep 79-22 Jan 80,
R. L. Hamlin, S. R. Boggs, M. S. Frick, T. Gram, and R. D. Davis. 4 Aug 80, 60p
Contract N01-CM-4-3746
Prepared by Ohio State Univ., Columbus. Dept. of Veterinary Physiology and Pharmacology, Rept. no. OSU-RHFP-182986-31.

Twenty-four healthy beaglehounds anesthetized with Innovar-vet (trademark) and sodium pentobarbital were instrumented for measuring cardiovascular parameters. Dogs (6 per group) were given vehicle or 1.25, 2.5 or 5.0 mg AZQ/kg (25, 50, 100 mg/sq. m.) body weight. Records were taken during 2 control periods, and at 5, 20, 40 and 60 minutes after termination of drug infusion. All dogs survived the 60 minutes of surveillance, and statistically significant alterations were observed only in QRS duration. In some dogs this interval prolonged, while in others it shortened. Alterations were observed in ST-T. When present T-waves in V3 became more inverted (in 7 dogs) and more positive (in 2 dogs). No systemic alteration was observed in any of the parameters whether measured or calculated. Occasionally there was an isolated change in some of the variables. One dog receiving the high dose had a fall in left ventricular end-diastolic pressure only during the 5 minute record. Another receiving the high dose developed a fall in cardiac output at the 40 minute recording. Three dogs receiving the intermediate dose and 4 dogs receiving the highest dose manifested large increments in systemic vascular resistance, and 3 dogs receiving the intermediate dose and 3 dogs the highest dose developed increases in pulmonary vascular resistance.

PB81-155574 PC **A03**/MF **A01**
East Central Oklahoma State Univ., Ada.
Mutagenistic Testing of Industrial Wastes from Representative Organic Chemical Industries.
Final rept. 17 Apr 79-17 Apr 80,
Susan Stinnett, Don Noble, Elmer Brown, and Harry Love. Jan 81, 33p EPA-600/2-81-007
Grant EPA-R-806557

The general applicability of the Ames test for screening wastewater samples was investigated. Application of the Ames test to raw and treated wastewaters from representative organic chemical industries involved the investigation of several problems: (1) the feasibility of using the Ames test to detect mutagens in wastewater samples; (2) the relative effectiveness of various waste treatment processes; (3) the mechanics of establishing an Ames testing program; and (4) the economics of using the test in routine environmental screening. Sample results were analyzed on the basis of relative increases in revertant colonies on test plates as compared to control spontaneous reversion plates. For a sample to be scored 'positive', six replicate test plates gave an average count of at least twice the control value. Of 46 samples provided, 6 were interpreted as positive, 22 were interpreted as negative, and 18 were not tested.

7. CHEMISTRY

7A. Chemical Engineering

AD-A094 755/6 PC **A04**/MF **A01**
Hercules, Inc., Radford, VA.
TNT Purification Studies. Task I. Comparative Cost Study of Purification Methods.
Final rept.,
J. R. Spencer, and E. E. Gilbert. Dec 80, 61p AD-E400 529
Contract DAAA09-77-C-4007

This project was initiated to provide cost data for three most promising methods of purifying TNT. The methods considered include nitric acid crystallization (followed by isomer separation via the Brodie Process), magnesium sulfite (followed by recovery of MgO for recycle) and Sellite (followed by chemical recovery via the Sonoco Process.)

ANL/CEN/FE-80-16 PC **A03**/MF **A01**
Argonne National Lab., IL.
Alkali Metal Vapor Removal from Pressurized Fluidized-Bed Combustor Flue Gas. Annual Report, October 1979-September 1980.
I. Johnson, W. M. Swift, and S. H. D. Lee. Oct 80, 26p
Contract W-31-109-ENG-38

In the application of pressurized fluidized-bed combustion (PFBC) to the generation of electricity, hot corrosion of the gas turbine (downstream from the combustor) by alkali metal compounds is a potential problem. The objective of this investigation is to develop a method for the removal of gaseous alkali metal compounds from the high-pressure high-temperature gas from a PFBC before the gas enters the gas turbine. The use of a granular bed filter, with either diatomaceous earth or activated bauxite as the bed material, is under study. Breakthrough data are reported on the sorption of gaseous NaCl by activated bauxite. Results are reported for the regeneration of activated bauxite using water leaching and a thermal swing method. (ERA citation 06:006911)

ANL/CNSV-9 PC **A09**/MF **A01**
Argonne National Lab., IL.
Energy and Materials Flows in the Production of Olefins and Their Derivatives.
L. L. Gaines, and S. Y. Shen. Aug 80, 184p
Contract W-31-109-ENG-38

Production of olefins and their derivatives uses almost 3.5% of the oil and gas consumed annually in the United States. It is estimated that their production requires an input energy of 2 Q, which is 50% of the energy used in the production of all petrochemicals. Substantial amounts of this energy could be recovered through recycling. For example, recycling of a single plastic product, polyester soft drink bottles, could have recovered about 0.014 Q in 1979. (About 1.4 Q is used to produce plastic derivatives of olefins). Petrochemical processes use fuels as feedstocks, as well as for process energy, and a portion of this energy is not foregone and can be recovered through combustion of the products. The energy foregone in the production of ethylene is estimated to be 7800 Btu/lb. The energy foregone in plastics production ranges from 12,100 Btu/lb for the new linear low-density polyethylene to 77,200 Btu/lb for nylon 66, which is about 60% of the total energy input for that product. Further investigation of the following areas could yield both material and energy savings in the olefins industry: (1) recycling of petrochemical products to recover energy in addition to that recoverable through combustion, (2) impact of feedstock substitution on utilization of available national resources, and (3) effective use of the heat embodied in process steam. This steam accounts for a major fraction of the industry's energy input. (ERA citation 06:007902)

ANL/MSD/FE-80-6 PC **A02**/MF **A01**
Argonne National Lab., IL.
Analysis of a Failed Hot-Gas Sampler Coupling from the IGT HYGAS Pilot Plant.
D. R. Diercks, and G. M. Dragel. Oct 80, 23p
Contract W-31-109-ENG-38

A coupling from a hot-gas sampling line in the HYGAS coal-gasification pilot plant failed after about 8470 hours in service. The coupling was made of RA 330, and was welded to 1.27- and 1.91-cm-OD lines at either end using Inconel 182 weld metal. Failure occurred in the form of intergranular corrosive attack and highly branched cracking from the inner surface of the base metal and interdendritic attack and cracking of the weld metal. The attacked intergranular and interdendritic regions were found to be high in sulfur, which was present both as CrS and Ni sub 3 S sub 2 . It was concluded that the coupling failed owing to high-temperature sulfidation, particularly of the high-nickel Inconel 182 weld filler metal, and the consequent formation of the liquid Ni sub 3 S sub 2 -nickel eutectic. Continuous water cooling of the coupling to maintain temperatures below those at which significant sulfidation can occur was recommended. Alternatively, the possible use of lower-nickel weld filler metals was suggested. (ERA citation 06:006838)

ANL-80-62 PC **A99**/MF **A01**
Argonne National Lab., IL.
Proceedings of the 1980 Symposium on Instrumentation and Control for Fossil Energy Processes.
R. W. Doering. 1980, 640p CONF-800602-
Contract W-31-109-ENG-38
Symposium on instrumentation and control for fossil energy processes, Virginia Beach, VA, USA, 9 Jun 1980.

The 1980 symposium on Instrumentation and Control for Fossil Energy Processes was held June 9-11, 1980, New Cavalier, Virginia Beach, Virginia. It was sponsored by the Argonne National Laboratory and the US Department of Energy, Office of Fossil Energy. Forty-five papers have been entered individually into EDB and ERA; nine papers had been entered previously from other sources. (ERA citation 06:006815)

DOE/CS/40276-T1 PC **A03**/MF **A01**
National Fertilizer Development Center, Muscle Shoals, AL.
Development of Technology in the Production of Fertilizers in Ammoniation-Granulation Plants. Progress Report No. 12, September 1980. Final Report.
Sep 80, 33p
Contract AI01-76CS40276

Work conducted to demonstrate procedures and equipment to conserve about 83% of fuel oil used for drying and generating steam in the ammoniation-granulation plants is reported. The general mechanism of granulation is examined. Conventional ammoniation-granulation plants are described and the new pipe-cross reactor system is described and schematics of their design are presented. Results of some demonstration tests reveal that an average of 785,000 Btu's per ton of production is eliminated with the installation of the TVA pipe-cross reactor process. It also reduces al-

mospheric emissions. Data on investment cost and payback period of the installation of a pipe-cross reactor in an existing TVA granulation fertilizer plant are presented. (ERA citation 06:007909)

DOE/ET/00276-T1 PC **A04**/MF **A01**
Pittsburgh Univ., PA.
Computer Simulation and Parametric Study of a Sasol Type Fluidized Bed Fischer-Tropsch Reactor.
P. R. Visser. 1979, 65p
Contract AS22-78ET00276

A computer program composed of a mass and energy balance for a Sasol type Fischer-Tropsch fluidized bed reactor is presented. A parametric study is performed using temperature, pressure, degree of hydrocarbon saturation and average hydrocarbon chain length as variables. Increasing temperature is found to decrease the amount of hydrocarbons formed. The results of variation of pressure confirmed a relationship exists between conversion, temperature and residence time. The effect on product distribution by varying the last two parameters is negligible. Relationships between reactor pressure and temperature and the hydrocarbon degree of saturation and average chain length exists, however, at this time only general trends are known. A summary of the thermodynamics and kinetics of the Fischer-Tropsch reaction is also presented. (ERA citation 06:006839)

DOE/ET/10104-T8 PC **A02**/MF **A01**
Pittsburg and Midway Coal Mining Co., Englewood, CO.
Solvent Refined Coal (SRC) Process.
Dec 80, 18p
Contract AC0176ET10104

This report summarizes the progress of the Solvent Refined Coal (SRC) project by The Pittsburg and Midway Coal Mining Co. at the SRC Pilot Plant in Fort Lewis, Washington and the Gulf Science and Technology Company Process Development Unit (P-99) in Harmarville, Pennsylvania, for the Department of Energy during the month of October, 1980. The Fort Lewis Pilot Plant was shut down the entire month of October, 1980 for inspection and maintenance. PDU P-99 completed two runs during October investigating potential start-up modes for the Demonstration Plant. (ERA citation 06:006840)

DOE/ET/14752-T1 PC **A06**/MF **A01**
Westinghouse Electric Corp., Madison, PA. Synthetic Fuels Div.
Advanced Coal Gasification System for Electric Power Generation. Third Quarterly Progress Report, April 1-June 30, 1980.
25 Jul 80, 121p
Contract AC01-80ET14752

The operation, maintenance and modifications to the Westinghouse gasification process development unit during the quarter are reviewed. The tests of the gasifier-agglomerator included direct coal feed as well as oxygen-blown gasification of a char or coal bed. Then the whole system was tested in single and double stage operation. Laboratory support involved fluidized bed test facilities at ambient temperature and at design temperature for devolatilization and gasification studies. Other laboratory systems were related to thermal analysis and pressurized high temperature studies of gasification and gas cleaning. (ERA citation 06:006841)

DOE/ET/14809-4 PC **A04**/MF **A01**
Brigham Young Univ., Provo, UT.
Investigation of Sulfur-Tolerant Catalysts for Selective Synthesis of Hydrocarbon Liquids from Coal-Derived Gases. Annual Technical Progress Report, September 19, 1979-September 18, 1980.
C. H. Bartholomew. 10 Oct 80, 58p
Contract AC01-79ET14809

Twelve supported iron and cobalt catalysts were prepared, including three boride-promoted catalysts, by a procedure developed previously in this laboratory. Each was characterized by H sub 2 and CO chemisorption measurements. Construction and testing of a high pressure laboratory microreactor system were completed. The system features a 0.65 cm tubular reactor, ice-temperature liquid traps, and a gas chromatograhic system for complete product analysis. Eight catalysts were tested at 90 kPa, 450 to 500 exp 0 K H sub 2 /CO = 2 to obtain product distribution, selectivity, and turnover number data. The results show that supports and promoters significantly affect specific activity and product selectivity of iron and cobalt in CO hydrogenation. (ERA citation 06:007093)

DOE/ET/14858-3 PC **A03**/MF **A01**
Chem Systems, Inc., Fairfield, NJ.
Development of Alcohol-Based Synthetic Transportation Fuels from Coal-Derived Synthesis Gases. Third Quarterly Progress Report, April 1-June 30, 1980.
3 Dec 80, 48p
Contract AC22-79ET14858

Fourteen catalysts were prepared by either evaporation of metal nitrate-citric acid solutions or by impregnation of inert supports with metal nitrate-citric acid solutions. Fourteen catalysts were tested in either the Berty gradientless reactor or the plug-flow reactor. These catalysts have been characterized intto the following five groups: Group I - catalysts containing Cu, Zn, Co, Cr and alkali; Group II - catalysts of Group I without Zn or Co or Cr; Group III - modified methanol synthesis catalysts of substituted by transition metals such as Fe, Mn, Ti, Th, etc; and Group V - catalysts of Groups I, II or IV supported on refractory cements such as silica or titania. Although none of the catalysts tested this quarter resulted in reaching the targetted oxygenates selectivities and space time yields, the following relevant observations were made: Transition metals in a catalyst having the general atomic formula CuZn sub 0 sub 125 CoK sub 0 sub 11 M and produced by evaporation of metal nitrate - citric acid solution affect oxygenates selectivity as indicated below (in descending order), Fe approx. Cr > V >> Mn; Potassium in a catalyst having the formula Cu Zn sub 0 sub 125 CoA sub 0 sub 11 is a better alkali promoter than cesium; Impregnation of inert supports with metal nitrate - citric acid solutions reduced activity and oxygenates productivity in comparison to the unsupported catalyst; Mechanical blending of metal oxides for a CuZn sub 0 sub 125 CoCrK sub 0 sub 11 results in better selectivity-conversion characteristics than coprecipitation or evaporation of nitrate-citric acid solutions. For a CuZn sub 0 sub 125 CoCrK sub 0 sub 11 catalyst reduced in situ in the presence of CO and CO sub 2 - containing syn gas, there was more than a two-fold increase in oxygenates selectivity over the 43 hour run period. (ERA citation 06:007096)

DOE/ET/20364-T1 PC **A04**/MF **A01**
Bend Research, Inc., OR.
Membrane Research for Salinity Gradient Energy Production. Final Report.
H. K. Lonsdale, R. W. Baker, K. L. Lee, and K. L. Smith. 16 Aug 78, 58p
Contract AC05-77ET20364

The results of an initial feasibility study of pressure retarded osmosis (PRO) as a power generation technique from various salinity gradient resources are presented. A number of flat sheet reverse osmosis membranes were evaluated including cellulose acetates, polyamide, polybenzimidazolone, and composite membranes. Reverse osmosis (RO) and direct osmosis (DO) experiments were used to predict the performance of the membranes under PRO conditions. The conclusions are: (1) concentration polarization is a major problem in PRO; (2) internal concentration polarization cannot be overcome by using brines of highly rejected salts such as magnesium sulfate; (3) useful PRO membranes do not require the ultrahigh permselectivity necessary in reverse osmosis, and a trade-off between flux and salt rejection is possible; (4) hollow fiber membranes are likely the most promising membrane geometry for two reasons: they allow control of external concentration polarization by circulation of solution on both sides of the membrane, and they are the cheapest form of membrane currently available; (5) the flux through a direct osmosis membrane using concentrated brine as the salt solution and seawater as the dilute solution is approximately half of the flux obtained when fresh water is used on the dilute side of the membrane; (6) because the operating pressures of PRO systems are lower than those used in RO, compaction of porous membranes due to hydrostatic pressure gradients is reduced; and (7) it appears that PRO is an economically viable power generation technique, provided that asymmetric (Loeb-Sourirajan-type) hollow fibers can be prepared with membrane fluxes comparable to flat sheet membranes. (ERA citation 06:007212)

DOE/JPL/954339-80/20 PC **A04**/MF **A01**
Battelle Columbus Labs., OH.
Evaluation of Selected Chemical Processes for Production of Low-Cost Silicon. Phase III. Twentieth Quarterly Progress Report, July 1-September 30, 1980.
J. M. Blocher, Jr., M. F. Browning, and D. A. Seifert. 19 Dec 80, 55p
Contract NAS-7-100-954339

A number of problems have conspired to prevent full operation of the PDU during the report period. After a review of the situation, it was decided to cease the day-by-day attempts to achieve PDU operation, and to review the situation and make such longer-term repairs or modifications as appeared necessary for increasing the probability of success. As a result, a list of 12 modifications was made and the modifications initiated so that PDU operation can be initiated early in the next quarter. Analysis of the data on the outgassing of zinc from the product of the miniplant was concluded, with the indication that outgassing times of the order of tens of hours would be required at 1100 C. The implications of leaving the zinc in the product, to be evolved in melting prior to ingot or sheet growth, were examined with the conclusion that at the 10-100 ppmw level of zinc in silicon, it may be difficult to detect the zinc evolution in the presence of the normal SiO evolution caused by reaction between the liquid silicon and the fused-quartz crucible. (ERA citation 06:007144)

DOE/JPL/954888-80/11 PC **A02**/MF **A01**
Kayex Corp., Rochester, NY.
Continuous Czochralski Growth. Silicon Sheet Growth Development of the Large Area Silicon Sheet Task of the Low Cost Silicon Solar Array Project. Eleventh Quarterly Progress Report, July 1-September 30, 1980.
B. R. Bezio. 1980, 8p
Contract NAS-7-100-954888

Progress is reported on the design modifications to a Hamco CG2000 RC crystal grower to provide the capability of growing a minimum of five silicon crystals, each of 30 kg weight, at a diameter of 150 mm from a 16-inch crucible. (ERA citation 06:007145)

DOE/MC/08218-T1 PC **A02**/MF **A01**
Science Applications, Inc., La Jolla, CA.
Upgrading of Nuclear Instrumentation on 42 Inch Gasifier: An Evaluation Report.
V. V. Verbinski, and F. Patricelli. 13 Nov 78, 14p
Contract AC21-78MC08218

At the risk of a complicated offering, four options have been presented for the sake of covering the range that extends from a lower priced option (1A) to a high performance option (2B). Option 2B is unqualifiedly recommended for providing the most complete Producer data and the fastest and most accurate response. These density and level data can be fully utilized when computerized control and the faster (future hydraulic) rabble arm action are introduced, which will greatly facilitate achieving the desired modes of Producer operation for long range studies of both the production and the off-gas treatment processes. Option 2B is rated as the most reliable on the grounds that the largest number of crystals and photomultiplier tubes are used: similar units have been basically operational for about seven years at MERC. The ionization chambers, having intrinsically infinite lifetime, have not been used at MERC. However, these are also expected to have a high overall reliability. They are utilized in Options 1B and 2B. Not only their lifetime, but their capability of operating with a lower gamma ray total field strength and with a lower change in field strength (as is required on the coal chutes and ash hoppers) make them far superior for operation as level gauges over a seven year service period. They are also much faster than GM tubes, which will reduce the probability that the level gauges (with ion chambers) will limit the con-

trol capabilities of the Producer. (ERA citation 06:006843)

DOE/METC/10499-27 PC **A05**/MF **A01**
Combustion Power Co., Inc., Menlo Park, CA.
Fluid Bed Solids Heater. Final Technical Report.
1980, 78p
Contract AC05-77ET10499

A solids heater which operates at up to 2000 F was designed, fabricated, installed and operated through checkout at the Morgantown Energy Technology Center at Morgantown, West Virginia. The system, designated the 2000 F Fluid Bed Solids Heater (FBSH) uses a fluidized bed to heat limestone to 600 F and aluminium oxide or silicon carbide to 2000 F and discharges heated solids upon demand. The FBSH with added valve handling and pressurization equipment is known as the Valve Hot Solids Test Unit and is intended for use by the US Department of Energy for testing of valves for severe service applications in coal conversion and utilization processes. The FBSH as designed and supplied by Combustion Power Company includes process equipment, controls, the enclosing building and other associated equipment. In the 600 F range of operation it can circulate limestone through two valve test trains simultaneously on a continuous basis. Only one valve test train is used for 2000 F solids and operation in that range is also continuous. Limestone, crushed to minus 5/16 size, is heated, discharged, and recycled at a maximum average rate of 250 lb/min while aluminum oxide or silicon carbide, No. 8 grit, is circulated at rates up to 167 lb/min. The FBSH control system is designed for automatic operation, and capability is included for external computerized data acquisition and/or supervisory control. An operating and maintenance manual and as-built drawings have been submitted. This report describes the FBSH equipment, its design basis, and its operation. It has been prepared and submitted in fulfillment of Contract Number DIAC05-77ET10499. (ERA citation 06:006844)

EPRI-AP-1592 PC **A07**/MF **A01**
DM International, Inc., Houston, TX.
Lignite-to-Methanol: An Engineering Evaluation of Winkler Gasification and ICI Methanol Synthesis Route. Final Report.
S. Goyen, E. Baily, J. Mawer, and R. Arai. Oct 80, 150p

The objective of the work reported herein was to develop a preliminary conceptual design, capital requirements, and product cost for a lignite-to-methanol plant incorporating Winkler Gasification Technology and ICI Methanol synthesis. The lignite-to-methanol complex described herein is designed to produce 15,000 TPD of fuel grade methanol. The complex is designed to be self-sufficient with respect to all utility services, offsites, and other support facilities, including power generation. Following is a summary of the results of the study: (1) Tons per day (TPD) of Lignite Feedstock and Fuel (as received) was 47,770; (2) TPD of Fuel Grade Methanol Product was 15,000; (3) Thermal efficiency, % (HHV) was 47.4; (4) Plant investment expressed in terms of first quarter of 1980 was ($ Million) 1545; and (5) Applying the economic premises used by EPRI for fuel conversion plant utility type financing, the calculated levelized and first year product costs are included. (ERA citation 06:006845)

EPRI-FP-1006(V.3)(Pt.1) PC **A05**/MF **A01**
Joy Industrial Equipment Co., Los Angeles, CA. Western Precipitation Div.
Electrostatic Precipitator Plate Rapping and Reliability. Volume 3, Part 1. Compendium Summary. Final Report.
H. W. Spencer, and D. Juricic. Oct 80, 87p

The study to develop data in support of an analytic model development of precipitator collecting surface responses to rapping was carried out as a portion of the work sponsored by the Electric Power Research Institute, Cottrell Environmental Sciences, Princeton University, Stanford University, and Southern Research Institute. The objective of the study was to develop a data base and numerical model which could, in the long term, lead to a design and optimization methodology for the design of collecting surfaces for use in electrostatic particulate precipitators. Response to varying in-plane rapping intensities was measured in the in- and out-of-plane directions. The dynamic response was obtained as a function of time, location, rapper, and plate configuration. These data were obtained on full-scale plates. In addition, laboratory-scale experiments were conducted to determine the effect of dust on surface response. The data obtained show that the dynamic response of the collecting surface is extremely complex. The stress waves generated by rapping travel at sonic velocities. These waves cause both complex in-plane and out-of-plane accelerations. The in-plane accelerations reach a maximum prior to the out-of-plane accelerations. Dust will dampen the response. Based on these findings, it is evident that additional work should be undertaken to evaluate the contribution of each acceleration mode, and intensity, on dust removal and reentrainment. (ERA citation 06:007712)

EPRI-FP-1006(V.3)(Pt.2) PC **A99**/MF **A01**
Joy Industrial Equipment Co., Los Angeles, CA. Western Precipitation Div.
Electrostatic Precipitator Plate Rapping and Reliability. Volume 3, Part 2. Compendium Appendixes. Final Report.
H. W. Spencer, and D. Juricic. Oct 80, 721p

The study to develop data in support of an analytic model development of precipitator collecting surface responses to rapping was carried out as a portion of the work sponsored by the Electric Power Research Institute, Cottrell Environmental Sciences, Princeton University, Stanford University, and Southern Research Institute. The objective of the study was to develop a data base and numerical model which could, in the long term, lead to a design and optimization methodology for the design of collecting surfaces for use in electrostatic particulate precipitators. Response to varying in-plane rapping intensities was measured in the in- and out-of-plane directions. The dynamic response was obtained as a function of time, location, rapper, and plate configuration. These data were obtained on full-scale plates. In addition, laboratory-scale experiments were conducted to determine the effect of dust on surface response. The data obtained show that the dynamic response of the collecting surface is extremely complex. The stress waves generated by rapping travel at sonic velocities. These waves cause both complex in-plane and out-of-plane accelerations. The in-plane accelerations reach a maximum prior to the out-of-plane accelerations. Dust will dampen the response. Based on these findings it is evident that additional work should be undertaken to evaluate the contribution of each acceleration mode, and intensity, on dust removal and reentrainment. (ERA citation 06:007713)

FE-1770-66 PC **A04**/MF **A01**
Systems, Science and Software, La Jolla, CA.
Computer Modeling of Coal Gasification Reactors. Year 4. Annual Report, October 1978-September 1979.
T. R. Blake, D. H. Brownell, Jr., P. J. Chen, J. L. Cook, and G. P. Schneyer. Mar 80, 62p SSS-R-80-4416
Contract AC21-76ET10242

The research in Year 4 was primarily directed to the application of the fluidized bed computer model to specific gasifier systems. These simulations include jet penetration of bubble formation, solids mixing and product gas composition for the Insititute of Gas Technology (IGT) six-inch diameter bench scale reactor, and cold flow predictions of jet penetration and solids recirculation in the IGT-UGAS and Westinghouse-Agglomerating Combustor/Gasifier reactors. The fluidized bed coal gasifier computer model is designed to provide a description of the hydrodynamic mixing and coupled chemistry within the reactor. This model should permit a designer to predict: bubble size, gas composition and temperature, stagnant particle regimes, elutriation, jet penetration, and solids mixing. It is basically a hydrodynamic model, including particle scale effects, which can, therefore, be used to study scaleup and optimization of fluidized bed gasifiers. The hydrodynamic component of the model has been validated through comparison with cold flow visualization data and limited hot flow measurements. The chemistry component of the model is, in most aspects, identical to the chemistry of the classical models of fluidized bed gasification. A major difference between the classical models and the present fluidized bed coal gasification computer model is that the classical models require specification of the bed hydrodynamics, such as bubble size. The present model can predict bubble size and the associated solids mixing. (ERA citation 06:006846)

FE-2270-68 PC **A08**/MF **A01**
Catalytic, Inc., Wilsonville, AL.
Solvent Refined Coal (SRC) Process: Operation of Solvent Refined Coal Pilot Plant, Wilsonville, Alabama. Quarterly Technical Progress Report, July-September 1979.
Dec 80, 174p
Contract AC01-76ET10154

Operating conditions and test results obtained at the six-ton-per-day Solvent Refined Coal (SRC) pilot plant in Wilsonville, Alabama, during the third quarter of 1979 are summarized. Kentucky 9 coal from the Lafayette Coal Company was processed at a nominal 38.5% slurry concentration. The dissolver space rate ranged from 35 to 55 lb of coal/hr-ft exp 3 . The dissolver pressure ranged from 1700 to 2100 psig, and the dissolver temperature was maintained at 825 exp 0 F. The conversion ranged from 90.5 to 94.6% of the MAF coal, while SRC yield averaged 50 to 60% of the MAF coal. Critical Solvent Deashing (CDS) recovery ranged from 65 to 83% of the SRC fed to the unit. An attempt was made to simulate the method for processing dissolver effluent that will be used in the 6000 tpd SRC-I demonstration plant to be constructed in Newman, Kentucky. The results of the Wilsonville tests showed what modifications would be necessary to achieve this goal. (ERA citation 06:006847)

FE-2315-55 PC **A03**/MF **A01**
Chevron Research Co., Richmond, CA.
Refining and Upgrading of Synfuels from Coal and Oil Shales by Advanced Catalytic Processes. Quarterly Report, April-June 1980.
R. F. Sullivan, and D. J. O'Rear. Jul 80, 27p
Contract AC01-76ET10532

The relationship between the measured cetane number and the calculated cetane index (ASTM D 976-66) was examined for 11 coal-derived diesel fuels. The cetane index is consistently less than the measured cetane number. Octyl nitrate was shown to be an effective cetane number improver for coal-derived diesel fuels. For a 40.2 cetane number base fuel which contained 2.4 vol % aromatics, 0.1 vol % octyl nitrate improved the cetane number by 3.5 and 0.3 vol % octyl nitrate improved the cetane number by 8.1. Aromatics were shown to inhibit the octyl nitrate as a cetane improver. In a short test, the feasibility of refining Wyodak H-Coal syncrude to a No. 2 fuel at low pressures was examined. Product made at 1000 psig total pressure (900 psia hydrogen) and 50% aromatics was stable. Product made at 500 psig total pressure (about 400 psia hydrogen) was unstable. Denitrified Wyodak H-Coal syncrude was hydrocracked in an extinction recycle pilot plant. The yields from this plant are very similar to the yields obtained from the denitrified Illinois H-Coal on SRC-II syncrudes. This task will complete our experimental program on the Wyodak H-Coal syncrudes. (ERA citation 06:006873)

FE-2346-68 PC **A24**/MF **A01**
Dow Chemical Co., Midland, MI.
Determination of Kinetic and Thermodynamic Parameters and Development of a Model for Designing and Evaluating in Situ Devonian Oil Shale Retorting.
R. A. Piccirelli, D. A. Crowl, R. W. Mickelson, C. B. Leffert, and R. H. Kummler. 1 Aug 80, 563p
Contract AC20-76LC10153

The overall objective was to gather data on Michigan oil shale chemistry and to develop computerized models of processes in combustion-driven in situ retorting in Michigan oil shale. An added goal was to use such models to support the planning and interpreting of field tests. These objectives were achieved partly by experiments on a new thermal analysis system capable of TGA, DTGA and DSC and on a multikilogram retort designed

and built at WSU/CEEC and partly by the development of a number of computerized models and the use of existing public codes all of which were implemented at the WSU Computer Center. Major new results include: rate expressions and parameters for the decomposition of oil shale in nitrogen and in air and for the combustion of char in air; a determination that inorganics in the shale such as pyrites and various clays have a significant effect on the pyrolysis rate; the development of several computerized models for single pieces of shale which include Darcy flow; predictions by these models that the pressure profile is quasisteady, that shrinking core behavior is realistic at early times, that char burning is difficult and that coupling of char combustion to pyrolysis can occur; the prediction that sustained combustion in a single vertical crack can be achieved; the prediction of conditions necessary for ignition; and the comparison of various retorting strategies with the finding that a cyclic reverse flow gave the best results. (ERA citation 06:006957)

FE-3125-24(V.1) PC **A10**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Coal Hydrogasification Process Development. Volume I. Coal Studies. Second Annual Technical Progress Report, Government Fiscal Year 1980.
L. P. Combs, S. K. Ubhayakar, L. S. Breese, D. R. Kahn, and W. T. Lee. 20 Oct 80, 221p
Contract AC01-78ET10328

This second annual technical progress report presents a detailed summary of work performed during Government Fiscal Year 1980 on coal hydrogasification process development. The several program tasks are structured to support logical progress toward process development and, eventually, commercialization. During this period, testing was concluded in a short-test-duration, engineering-scale, hydrogasification test facility. Test results helped to establish an adequate data base for proceeding confidently with the other program tasks. Correlation of the data, using nonlinear multiple regression techniques, against a set of phenomenological hydropyrolysis reactions is leading to a powerful analytical predictive tool. The design was completed and construction started on a 3/4-TPH integrated process development unit capable of continuous operation for up to 30 days. To support an ambitious schedule for facility construction by subcontractors, much of the needed equipment has been ordered by advance procurement action. Structural steel erection is in progress. Other subcontracted construction work has been postponed for budgetary reasons. (ERA citation 06:006848)

FE-3125-24(V.2) PC **A08**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Coal Hydrogasification Process Development. Volume II. Peat Studies. Second Annual Technical Progress Report, Government Fiscal Year 1980.
K. M. Sprouse, and J. K. Rosemary. 20 Oct 80, 151p
Contract AC01-78ET10328

This report describes work performed on a program directed towards investigating the effects of peat hydrogasification in an entrained flow reactor. The program was conducted in three phases: peat dense-phase feed system flow studies, hydrogasification entrained flow reactor testing, and preliminary peat process economic evaluations. The peat dense-phase feeding studies included low-pressure (below 150 psig) testing at nominal solid peat flow rates of 1 ton/hr and analytical modeling efforts. The hydrogasification reactor testing was performed at peat flow rates of over 1000 lb/hr and reactor temperatures to 1900 exp 0 F in hydrogen atmospheres from 500 to 1000 psig. A simple analytical kinetic model was developed to predict total carbon conversion as a function of reactor operating variables and its agreement with experimental data was found to be excellent. Finally, preliminary process economics were established for three variations of the Cities Service/Rockwell (CS/R) Flash Hydropyrolysis Process with the cost of high-Btu gas ranging from $3.43 to $4.06 per million Btu. (ERA citation 06:006849)

IDO-10089 PC **A03**/MF **A01**
United States Steel Corp., Monroeville, PA. Research Lab.
Use of Coal Injection and Oxygen in a Blast Furnace to Produce Fuel Gas. Final Report, November 26, 1980.
Dec 80, 37p
Contract AC07-76ID01570

The feasibility of operating a blast furnace with coal injection and oxygen to produce fuel gas has been evaluated. Probable operating conditions were based on United States Steel Corporation's experience with coal injection on an experimental blast furnace. It was found that the cost of the gas produced would, as expected, be sensitive to the costs of coal, coke, and oxygen used and also to the capability of the process to burn coal instead of coke. To be economically viable, the medium Btu produced (270 Btu per standard cubic foot (Btu/scf)) from coal, coke, and oxygen at $30 per ton ($/T), $100/T, and $48.60/T, respectively, would have to have a selling price between $6.74 per million Btu ($/MMBtu) and $7.38/MMBtu depending on the coal-to-coke ratio assumed to be achieved in the process. Because these selling prices are considerably higher than current costs for natural gas or fuel oil, it would appear that the operation of a blast furnace as a fuel gas producer would not be economically viable at this time. (ERA citation 06:006850)

ORNL/TM-6693 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
Hydrocarbonization Research: Completion Report.
E. L. Youngblood, H. D. Cochran, Jr., P. R. Westmoreland, C. H. Brown, Jr., and G. E. Oswald. Jan 81, 134p
Contract W-7405-ENG-26

Hydrocarbonization is a relatively simple process used for producing oil, substitute natural gas, and char by heating coal under a hydrogen-rich atmosphere. This report describes studies that were performed in a bench-scale hydrocarbonization system at Oak Ridge National Laboratory (ORNL) during the period 1975 to 1978. The results of mock-up studies, coal metering valve and flowmeter development, and supporting work in an atmospheric hydrocarbonization system are also described. Oil, gas, and char yields were determined by hydrocarbonization of coal in a 0.1-m-diam fluidized-bed reactor operated at a pressure of 2170 kPa and at temperatures ranging from 694 to 854 K. The nominal coal feed rate was 4.5 kg/h. Wyodak subbituminous coal was used for most of the experiments. A maximum oil yield of approx. 21% based on moisture- and ash-free (maf) coal was achieved in the temperature range of 810 to 840 K. Recirculating fluidized-bed, uniformly fluidized-bed, and rapid hydropyrolysis reactors were used. A series of operability tests was made with Illinois No. 6 coal to determine whether caking coal could be processed in the recirculating fluidized-bed reactor. These tests were generally unsuccessful because of agglomeration and caking problems; however, these problems were eliminated by the use of chemically pretreated coal. Hydrocarbonization experiments were carried out with Illinois No. 6 coal that had been pretreated with CaO-NaOH, Na sub 2 CO sub 3 , and CaO-Na sub 2 CO sub 3 . Oil yields of 14, 24, and 21%, respectively, were obtained from the runs with treated coal. Gas and char yield data and the composition of the oil, gas, and char products are presented. (ERA citation 06:006851)

PAT-APPL-6-123 605 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Low Pressure Pneumatic Lifter.
Patent Application,
W. M. Ingle, R. S. Rosler, S. W. Thompson, and D. Bennett. Filed 22 Feb 80, 15p
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A low pressure pneumatic lifter apparatus is provided in which gas-solid heterogeneous reactions take place under low pressure conditions (e.g., less than one atmosphere). The apparatus includes an elongate lifter or riser tube to which solid particles are supplied for entrainment by a carrier gas for reaction with reactant gas. The solid particles and reactant gas are supplied at the base of the lifter tube and react as they pass upwardly through the tube. A vacuum pump provides upward movement of the particles while maintaining the low pressure in the lifter tube. In a preferred embodiment, the apparatus is used for silicon harvesting, with heated silicon particles reacting with Si/sub x/F/sub y/ homologues supplied together with SiF sub 4 fluidizing gas from a vaporizer for (SiF sub 2)/sub x/ polymers. (ERA citation 06:005113)

PATENT-4 197 285
Not available NTIS
Department of Energy, Washington, DC.
Regeneration of Lime from Sulfates for Fluidized-Bed Combustion.
Patent,
R. T. Yang, and M. Steinberg. Filed 7 Dec 77, patented 8 Apr 80, 6p PAT-APPL-858 221
Supersedes PAT-APPL-858 221-77.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

In a fluidized-bed combustor the evolving sulfur oxides are reacted with CaO to form calcium sulfate which is then decomposed in the presence of carbonaceous materials, such as the fly ash recovered from the combustion, at temperatures of about 900 exp 0 to 1000 exp 0 C, to regenerate lime. The regenerated lime is then recycled to the fluidized bed combustor to further react with the evolving sulfur oxides. The lime regenerated in this manner is quite effective in removing the sulfur oxides. (ERA citation 06:005203)

PB81-159915 PC **A08**/MF **A01**
Romar Consultants, Inc., Philadelphia, PA. Technical Information Div.
Handbook for Obtaining Chemical Use and Related Economic Information.
Final rept. Sep 79-Dec 80,
Marcus Sittenfield. Dec 80, 163p EPA-560/2-80-001
Contract EPA-68-01-5926

The handbook describes methods of finding chemical use and economic information in reference, on-line, and industry sources, and evaluates many current sources which contain information such as physical/chemical properties, chemical functions and applications, and production/consumption quantities. Sections 1-3 describe steps that can be followed to learn basic information about the uses of a chemical and the economics of those uses, either by chemical or by use. Appendix A evaluates over 100 sources in a standard format that displays the type of information in the source, the means of access to the information, organization of the information, and limitations or difficulties in utilizing the sources. Appendices B- provide lists of sources for different kinds of information and lists of different kinds of sources.

PB81-160293 PC **A03**/MF **A01**
Alternate Energy Associates, Inc., Pittsburgh, PA.
Small Waste to Ethanol Plants, Phase I,
George F. Huff, and M. Clark Fogle. Sep 80, 28p NAFC-80-15
See also Phase 2, PB81-160301.

This is a study of the economics of the conversion of waste cellulose to ethanol through enzyme hydrolysis developed at three production levels: 1 million, 5 million, and 10 million gallons per year of motor grade alcohol. The feedstock is the combustible portion of MSW and a nearby waste separation plant is assumed. It is also assumed that the alcohol plant is located inside the fence of an existing operating facility where steam and other utilities and services are available for purchase. No credit is taken for the protein by-product of the fermentation process; it is dried and used as boiler fuel or the parent plant. Study results indicate none of these plants to be competitive without a substantial subsidy. The enzyme technology is too capital intensive to be suitable for small plants.

SERI/TR-33-239(V.3) PC **A14**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Survey of Biomass Gasification. Volume III. Current Technology and Research.
Apr 80, 302p

Contract EG-77-C-01-4042

This survey of biomass gasification was written to aid the Department of Energy and the Solar Energy Research Institute Biological and Chemical Conversion Branch in determining the areas of gasification that are ready for commercialization now and those areas in which further research and development will be most productive. Chapter 8 is a survey of gasifier types. Chapter 9 consists of a directory of current manufacturers of gasifiers and gasifier development programs. Chapter 10 is a sampling of current gasification R and D programs and their unique features. Chapter 11 compares air gasification for the conversion of existing gas/oil boiler systems to biomass feedstocks with the price of installing new biomass combustion equipment. Chapter 12 treats gas conditioning as a necessary adjunct to all but close-coupled gasifiers, in which the product is promptly burned. Chapter 13 evaluates, technically and economically, synthesis-gas processes for conversion to methanol, ammonia, gasoline, or methane. Chapter 14 compiles a number of comments that have been assembled from various members of the gasifier community as to possible roles of the government in accelerating the development of gasifier technology and commercialization. Chapter 15 includes recommendations for future gasification research and development. (ERA citation 05:025595)

STUDSVIK/M-78/375 PC **A03**/MF **A01**
Studsvik Energiteknik AB, Nykoeping (Sweden).
Additives for Steam Cycles.
L. Dahl. Dec 78, 39p
In Swedish.
U.S. Sales Only.

Properties of amines used in steam cycles have been studied. For different commercial products the following characteristics have been listed: rate of decomposition at different temperatures, type of decomposition products and their properties, distribution between steam and water, and alkalizing effect. The investigation is based on figures from suppliers, handbooks, and personal contacts. (ERA citation 06:006363)

7B. Inorganic Chemistry

DOE/LC/10787-56 PC **A02**/MF **A01**
Geokinetics, Inc., Concord, CA.
GKI Chloride in Water, Analysis Method. GKI Boron in Water, Analysis Method.
L. L. Morriss. May 79, 9p
Contract FC20-78LC10787

Procedures for the chemical analysis of chlorides and boron in water are presented. Chlorides can be titrated with mercuric nitrate to form mercuric chloride. At pH 2.3 to 2.8, diphenylcarbazone indicates the end point of this titration by formation of a purple complex with mercury ions. When a sample of water containing boron is acidified and evaporated in the presence of curcumin, a red colored product called rosocyanine is formed. This is dissolved and can be measured photometrically or visually. (ERA citation 06:008003)

UJV-4502-CH PC **A02**/MF **A01**
Ustav Jaderneho Vyzkumu, Rez (Czechoslovakia).
Physical and Chemical Properties of Volatile Ruthenium Fluorides.
V. Rak, and F. Lisy. May 79, 14p
U.S. Sales Only.

Available data published before 1977 on the preparation and the physical and chemical properties of ruthenium hexafluoride, ruthenium oxide tetrafluoride, ruthenium pentafluoride and ruthenium octa-fluoride are compiled. (Atomindex citation 11:546456)

7C. Organic Chemistry

AD-A094 772/1 PC **A02**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
Dialkylimidazolium Chlorides.
Interim rept. Dec 79-Dec 80,
John S. Wilkes, and Joseph A. Levisky. Jan 81, 20p Rept no. FJSRL-TR-81-0001

The iodide salts of the 1,3-alkylated imidazoles are readily prepared by quaternization of the nucleophilic nitrogen of N-substituted imidazoles with alkyl iodides. Direct alkylation by the appropriate chloroalkanes proved to be more successful. In some cases the product was obtained in high yield and was quite pure, even without recrystallation. The procedure for reactions using chloromethane or chloroethane (both gases) consisted of heating the homogeneous mixture of 1-alkylimidazole and chloroalkane in a sealed vessel. Excess chloroalkane was removed by evaporation and the residue was almost pure product. NMR analysis of the residue showed nearly 100% conversion. In the case of liquid chloroalkanes, reactions were run by refluxing mixtures of the reactants, using excess chloroalkane as solvent. The formation of VIII was relatively slow under these conditions, but was much more rapid when run in a sealed tube at 80 C. Proton NMR provides a convenient way to monitor the extent of reaction for all of the imidazolium salts, since there is no overlap of reactant and product resonances. In those compounds the C-2 proton resonance in the salt is shifted considerably downfield from the position in the neutral 1-methylimidazole, and it is exchangeable with D2O.

AD-A094 885/1 PC **A02**/MF **A01**
Texas Christian Univ., Fort Worth. Dept. of Chemistry.
Synthesis and Reactivity of a New (Methylene)Phosphine.
Technical rept. for period ending 1980,
Robert H. Neilson. 27 Jan 81, 21p Rept no. TR-81-01
Contract N00014-79-C-0632

A new, stable (methylene)phosphine (Me3Si)2N-P=CHsiMe3 (4) was prepared via dehydrohalogenation of the chlorophosphine, (Me3Si)2N-P(Cl)-CH2SiMe3 (1), using LiN(SiMe3)2 as the base. Compound 1 and the related phosphine, (Me3Si)2NP(CH2SiMe3)2 (2), were obtained by treating (Me3Si)2NPCl2 with either one or two equivalents of Me3SiCH2MgCl. Reaction of 1 with t-BuLi proceeded via chloride displacement rather than dehydrohalogenation to afford the t-butylphosphine, (Me3Si)2NP(t-Bu)CH2SiMe3 (3). Two different modes of reactivity of 4 were observed: methanol added to the p pi bond yielding the methoxyphosphine, (Me3Si)2NP(OMe)CH2SiMe3 (5), while treatment with Me3SiN3 gave the novel imino (methylene)phosphorane, (Me3Si)2NP(=NSiMe3)(=CHSiMe3) (6). Compound 6 also added methanol to form a P-methoxyphosphinimine, (Me3Si)2NP(OMe)(=NSiMe3)CH2SiMe3 (7).

AD-A095 074/1 PC **A02**/MF **A01**
University of Southern California, Los Angeles.
Nitration and High Energy Nitrogen Compounds.
Summary research rept. 15 Jul 77-14 Oct 80,
George A. Olah. 15 Jan 81, 9p ARO-15156.6-C
Grants DAAG29-77-G-0173, DAAG29-78-G-0106

Electrophilic nitration of aromatics with a wide variety of nitrating systems were carried out to elucidate the general mechanism of the reaction. The study with reactive nitrating agents clearly reinforce our earlier view that substrate and positional selectivity are determined in two separate steps. Studies on the nitration of naphthalene show that the suggested radical cation pair mechanism is not of general importance. The reversibility of electrophilic aromatic nitration was demonstrated using superacid catalysts. Transfer nitrations were carried out with various transfer nitrating agents including preparation of nitrite esters of polyols. Solid superacid catalized nitration of aromatics with various nitrating agents was developed. The ambident reactivity of nitronium ion was demonstrated in the reaction of sulfides, selenides and phosphines using 13C, 15N and 31P NMR spectroscopy. (Author)

CONF-801227-2 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Reaction of Carbon-14-Labeled Reagents with Coal.
C. J. Collins, V. F. Raaen, C. Hilborn, W. H. Roark, and P. H. Maupin. 1980, 12p
Contract W-7405-ENG-26
Atomic and nuclear methods in fossil energy research meeting, Mayaguez, Puerto Rico, 1 Dec 1980.

Both asphaltenes and preasphaltenes from Illinois No. 6 vitrain exhibit enhanced uptake of exp 14 CH sub 2 N sub 2 after air exposure. Preasphaltenes however exhibit decreased exp 14 CC1 sub 2 uptake after oxygen treatment. These results are in agreement with a scheme in which aryl alkyl ethers and benzylic-type linkages are oxidized to ketones and then carboxylic acids. Heat treatment of Wyodak coal appears to destroy most of the aryl alkyl ethers present, since HBr-treated Wyodak, after reacting with diazomethane- exp 14 C contains twice the acid-hydrolyzable methyl- exp 14 C groups exhibited by heat-treated Wyodak. Thermolysis of alpha -naphthol- exp 14 C and of beta -naphthol- exp 14 C in the presence of Illinois No. 6 coal results in loss of hydroxyl to produce water as well as in alkylation of the naphthalene nucleus, processes which we presume also occur in the phenolic moieties in the coal itself. Thiophenol-exp 14 C yields hydrogen sulfide, toluene, ethylbenzene, thianthrene, and dibenzothiophene. The results for the thermolyses of alpha - and beta -naphthol- exp 14 C and of thiophenol- exp 14 C are explained through free radical mechanisms quite similar to those previously postulated for the thermolyses of model compounds in the presence of tetralin. (ERA citation 06:006871)

ORNL/TM-7569 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Determination of Dibutylphosphoric Acid in Carbonate, Oxalate, or Nitrate Solutions by Ion Chromatography.
J. M. Keller, and R. R. Rickard. Jan 81, 17p
Contract W-7405-ENG-26

Relatively high concentrations of carbonate, oxalate, or nitrate interfere with the direct termination of dibutylphosphoric acid (DBP) by ion chromatography. Carbonate and oxalate are effectively separated from the DBP as insoluble barium salts. A chromatographic method employing reverse-phase resin removes the nitrate interference. Recovery of DBP from carbonate and oxalate solutions exceeds 98% and from nitrate solutions, approximately 88%. (ERA citation 06:006996)

PATENT-4 239 701 Not available NTIS
Department of Agriculture, Washington, DC.
Ternary Salts of Tris(Aminomethyl)Phosphines and Their Oxides.
Patent,
Arlen W. Frank, Donald J. Daigle, and Russell M. H. Kullman. Filed 26 Jul 79, patented 16 Dec 80, 3p PB81-162257, PAT-APPL-6-061 322
Supersedes PB80-101009.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Novel ternary salts of tris(aminomethyl) phosphines and their oxides having the formula (R2NH(+1)CH2)3P(O)(n)3X(-1), wherein R is hydrogen, an alkylradical having from 1 to 6 carbon atoms, or an aryl radical n is an integer from 0 to 1, and X is a halogen, are prepared by the reaction of a hydrohalic acid, HX, with various nitrogen- and phosphorus-containing compounds including tris(aminomethyl)phosphines and their oxides, tris(N-carbalkoxylaminomethyl)phosphines oxides, and 1,3,5-triaza-7-phosphaadamantane and its 7-oxide.

PATENT-4 246 031 Not available NTIS
Department of Agriculture, Washington, DC.
Prepolymer Preparation and Polymerization of Flame Retardant Chemicals from THP-Salts.
Patent,
Galoust M. Elgal, Rita M. Perkins, and Nestor B. Knoepfler. Filed 11 Oct 78, patented 20 Jan 81, 6p PB81-162281, PAT-APPL-950 493
Supersedes PB-290 542.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing.

Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The patent describes a flame retardant prepolymer composition for imparting flame retardance to cotton, cellulosic textiles, and certain other materials; the process for preparing the prepolymer composition; and the application technique of said prepolymer composition are disclosed. Tetrakis(hydroxymethyl)phosphonium sulfate, a THP salt, is acidified; ammonia gas is bubbled into the mixture to achieve a constant boiling, these steps are repeated a number of times, and the prepolymer mixture thus prepared is then applied to a substrate, followed by treatment with a caustic solution.

PATENT-4 249 017 Not available NTIS
Department of Agriculture, Washington, DC.
Tris(N-Carbalkoxylaminomethyl)-Phosphine Oxides and Sulfides.
Patent,
Arlen W. Frank. Filed 29 Nov 78, patented 3 Feb 81, 7p PB81-162232, PAT-APPL-964 852
Supersedes PB-290 548.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The title compounds, having the formula (RO2CNHCH2)3PY where Y = oxygen or sulfur, are prepared by reacting a tris(N-carbalkoxylaminome-thyl)phosphine, having the formula (RO2CNHCH2)3P, with an oxidizing or sulfurizing agent. The products, after methylolation with formaldehyde, are useful as finishing agents for imparting flame retardant properties to cotton fabrics.

PB81-140030
(Order as PB81-139859, PC **A05**/MF **A01**)
Sind Univ., Jamshoro (Pakistan). Dept. of Pharmacy.
Pharmacological Studies on New Analogs of Tremorine (I),
W. W. Baloch, D. Dorrescu, E. Cristra, and M. Iovu. 21 Oct 79, 7p
Included in Scientia Sinica, v25 n12 p1052-1062 Dec 80.

The analgesic medicines in a rather large number are quite differentiated from one another in intensities as well as in adverse effects. Studies have been carried out to explore the compounds which exert analgesic effects but reduce adverse effects. It was found that tremorine 1,4-dipyrrolidino-2-butyne acted on vegetative nervous systems. Tremorine is avoided in therapy because of its unpleasant and undesirable effects on the animals. The authors tried to synthesize new compounds with better analgesic effects.

PB81-159287
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Shanghai (China). Shanghai Inst. of Biochemistry.
A New Fluorescent Hydrazide for Sequencing Ribonucleic Acids,
Liu Wangyi, Gu Xiangrong, and Cai Ju'e. 9 Jul 79, 13p
Included in Scientia Sinica, v23 n10 p1296-1308 Oct 80.

This paper deals with the synthesis and properties of a fluorescent hydrazide and its hydrazones of nucleoside dialdehydes and of 5'-methylene nucleoside dialdehydes. Hydrazination of 1-dimethylaminonaphthalene-5-sulphonyl-glycyl ethyl ester (DNS-Gly-OC2H5) gives the fluorescent carbonyl reagent, 1-dimethylaminonaphthalene-5-sulphonyl-glycyl hydrazide (DNS-Gly-NHNH5). The ultraviolet absorption spectra, the molar extinction coefficients, the fluorescent spectra as well as the quantum yields of the hydrazide and its nucleoside hydrazones in water, ethanol and dioxane are measured. The fluorescent intensities of the hydrazone increases with the decrease of solvent polarity. A micromethod is described for sequencing oligoribonucleotides by stepwise beta-elimination followed by fluorescent labelling of their 3'-terminal nucleosides. The sensitivity of this method indicates that tetraribonucleotide with A(260nm) as little as 0.16 is sufficient for sequence determination.

7D. Physical Chemistry

AD-A094 637/6 Not available NTIS
University of Southern California, Los Angeles. Dept. of Chemistry.
Theoretical Studies of the Low-Lying Electronic States of GaKr, including Extrapolation to InKr and TlKr,
Thom. H. Dunning, Jr., Marcy Valley, and Howard S. Taylor. 25 Apr 78, 10p
Contract N00014-77-C-0102
Availability: Pub. in Jnl. of Chemical Physics, v69 n6 p2672-2681, 15 Sep 78 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A094 707/7 PC **A02**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
Theoretical Modeling of SCOT Columns.
Final rept. 1 Jul 57-30 Sep 80,
Robert H. Foglesong. Dec 80, 14p Rept no. FJSRL-TR-80-0019

A description of the thermodynamic processes that occur within a SCOT column is presented. The unique geometry of the SCOT column was found to slightly alter the mathematical description of the thermodynamic phenomena as compared to the traditional packed column. The correlation derived from this thermodynamic description was used to determine experimental values for the heats of vaporization and boiling points for several light alcohols to verify its usefullness and validity. (Author)

AD-A094 739/0 PC **A05**/MF **A01**
Battelle Columbus Labs., OH.
An Investigation of the Effects of Oxygen and Water Vapor on the Compressive Film Strength of Boundary Films on Iron Substrates.
Final rept. 1 Jun 79-30 Nov 80,
Edmund Drauglis, and David K. Snediker. 31 Dec 80, 91p AFOSR-TR-81-0036
Grant AFOSR-76-3051

The objectives of this program are to determine the effects of water and oxygen on the compressive strength of boundary lubricant films and to correlate these effects with the fundamental physical and chemical phenomena responsible for the formation and stabilization of the films and the inverse phenomena of degradation and dissolution. Compressive film strengths were measured under controlled atmospheres by means of a unique film penetration apparatus developed at Battelle. All experiments were performed on films formed from the diester di-2-ethylhexyl sebacate containing various amounts of tricresyl phosphate. It was found that water is detrimental to the formation of good boundary films and that oxygen is necessary for the formation of good boundary films. Scanning electron microscopy showed that nonmetallic inclusions on ARMCO iron surfaces play an important role in initiating the formation of strong boundary films. Experiments with inclusion-free zone refined iron verified this result. Fourier transform infrared spectroscopy and X-ray photoelectron spectroscopy were also used to study the surface chemistry of the films. These techniques seem to indicate that the residual films are almost exclusively inorganic phosphates. (Author)

AD-A094 790/3 PC **A02**/MF **A01**
IBM Research Lab., San Jose, CA.
Workshop on Recent Experimental and Theoretical Approaches to the Study of the Electrical Double Layer Held at San Jose, California on 23-25 July 1980.
Final rept.,
Douglas Henderson, L. Blum, R. Fawcett, J. Gordon, II , and R. Parsons. 1980, 13p AFOSR-TR-81-0020
Contract F49620-80-C-0062

A small group of scientists interested in fundamental and applied problems related to the electrical double layer were brought together. The workshop consisted of twelve reviews and a panel discussion. The report includes specific recommendations for future work.

AD-A094 806/7 PC **A04**/MF **A01**
North Carolina Univ. at Chapel Hill. William R. Kenan, Jr., Labs. of Chemistry.
Kinetics of Electrocatalysis of Dibromoalkyl Reductions Using Electrodes with Covalently Immobilized Metallotetraphenylporphyrins.
Technical rept.,
Roy D. Rocklin, and Royce W. Murray. 29 Jan 81, 51p Rept no. TR-15
Contract N00014-76-C-0817

The reduction of PhCHBrCH2Br, PhCHBrCHBrPh, and CH2BrCHBrCH3 at the surfaces of electrodes to which cobalt (II) or copper (II) tetra(p-aminophenyl)porphyrin has been covalently attached is strongly catalyzed by reduction of the metalloporphyrin. The rate of electrocatalytic reduction was measured using rotated disk electrode voltammetry, and was independent of the amount of metalloporphyrin on the electrode above an estimated monomolecular coverage level. The results are consistent with theory which assumes that the rate of diffusion of electrochemical charge through the porphyrin layer is faster than the rate of diffusion of catalytic substrate through the layer. Comparison of the electrocatalytic rates for the different substrates indicates the electron transfer mediation involves specific interactions between substrate and metalloporphyrin rather than being a simple outer sphere electron transfer event. Potential step chronoamperometry is introduced as an alternative method for electrocatalytic measurements at modified electrodes. (Author)

AD-A094 872/9 PC **A03**/MF **A01**
Princeton Univ., NJ. Joseph Henry Lab. of Physics.
The Stability of Periodic Orbits.
Technical rept.,
Leigh Sneddon. 21 Jan 81, 38p
Contract N00014-77-C-0711

The linear stability analysis of a periodic orbit, X(o)(t), of a dynamical system X = F(X), is related to the anomalous ferromagnetic resonance properties of ferrites. It is shown to have a continuous sequence of normal mode problems associated with it. This sequence defines a natural set of coordinate axes which allow the stability analysis to be put in a form which has already been dealt with analytically in the ferrite resonance theory. A simplification which allowed the basic experimental properties to be accounted for is applied to the stability analysis. The simplified analytic solution is obtained for three-mode systems, its properties and consequences are discussed and it is checked against some rigorous results. (Author)

AD-A094 906/5 PC **A02**/MF **A01**
Indiana Univ. at Bloomington. Dept. of Physics.
Covalent Bonds in Ionic Crystals,
G. D. Mahan. 23 Jul 80, 5p AFOSR-TR-81-0099
Grant AFOSR-76-3106
Pub. in Chemical Physics Letters, v76 n1 p183-185, 15 Nov 80.

No abstract available.

AD-A094 907/3 PC **A02**/MF **A01**
Arizona Univ., Tucson. Optical Sciences Center.
Effects of Signal Detuning on Phase Conjugation,
Tao-yi Fu, and Murray Sargent, III. 13 Jun 79, 4p AFOSR-TR-81-0104
Grant AFOSR-79-0122
Pub. in Optics Letters, v4 n11 p366-368 Nov 79.

No abstract available.

AD-A094 917/2 PC **A02**/MF **A01**
Indiana Univ. at Bloomington. Dept. of Physics.
Photoemission from Alkali Halides: Energies and Line Shapes,
G. D. Mahan. 16 May 79, 14p AFOSR-TR-81-0100
Grant AFOSR-76-3106
Pub. in Physical Review B, v21 n10 p4791-4803, 15 May 80.

No abstract available.

AD-A094 921/4 PC **A02**/MF **A01**
California Univ., San Diego, La Jolla. Dept. of Chemistry.
Brownian Motion of Harmonic Systems with Fluctuating Parameters. II. Relation between Moment Instabilities and Parametric Resonance,
Katja Lindenberg, V. Seshadri, and Bruce J. West. 12 May 80, 11p
Contract N00014-78-C-0497
Pub. in Physical Review A, v22 n5 p2171-2179 Nov 80. See also AD-A091 179.

No abstract available.

AD-A094 964/4 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Gas Flow Tube for Spectroscopic Studies.
Master's thesis,
Vernon Raymond Koym. Dec 80, 106p Rept no. AFIT/GEP/PH/80-5

A gas flow tube was constructed to allow chemical reaction studies at pressures from 0.1 torr to 30 torr. The tube was designed to allow introduction of oxidants, diluents, or excited gases. A furnace was constructed to produce high temperature vapor in the combustion chamber of the flow tube. The flow tube was characterized by its pumping speed, pressure, throughput, and evaluating Reynold's and Knudsen's numbers at pressures from 0.1 - 20 torr. Two experiments were conducted to verify the flow tube performance. Singlet molecular oxygen was produced in a microwave discharge and reacted with gaseous I2 to yield chemiluminescence from the transition I2(B) yields I2(X). The spectrum was recorded and the bandheads assigned to vibrational transitions predicted by theory. PbO was created by reacting vaporized lead with N2O. The emissions were compared with literature. (Author)

AD-A094 970/1 PC **A02**/MF **A01**
Princeton Univ., NJ.
Broken Symmetry, Emergent Properties, Dissipative Structures, Life: Are They Related.
P. W. Anderson, and D. L. Stein. 21 Jan 81, 25p
Contract N00014-77-C-0711, Grant NSF-DMR78-03015

We conclude that there is no analogy visible between the stability, rigidity and other emergent properties of equilibrium broken symmetry systems, and the properties of dissipative systems driven far from equilibrium. The latter types of systems have never been observed to, nor can any mathematical reason be found why they should, exhibit the rigidity, stability, and permanence which characterizes the thermodynamically stable broken symmetry systems. (A case point of a driven system that might have exhibited broken symmetry but failed to do so is described.) The reason this is unfortunate is that many authors have chosen to use such systems as the laser and the Benard instability as models for the nature and origin of life itself, as an emergent property of inanimate matter. It is indeed an obvious fact, noted since Schrodinger's 1940 book, that life succeeds in maintaining its stability and integrity, and the identity of its genetic material, at the cost of increasing the rate of entropy production of the world as a whole. It is at least in that sense a stable 'dissipative structure'-i.e., an existence proof by example. Let us then conclude by reiterating our main point: we still believe, since in fact we understand the process in all details, in the reality of emergent properties: the ability of complex physical systems to exhibit properties unrelated to those of their constituents. But we do not believe that stable 'dissipative structures' maintained by dynamic driving forces can be shown to exist in any inanimate system, and thus we do not see how speculations about such structures and their broken symmetry can yet be relevant to the still open question of the origin and nature of life.

AD-A094 977/6 PC **A02**/MF **A01**
North Carolina Univ. at Chapel Hill. William R. Kenan, Jr., Labs. of Chemistry.
Rectifying Interfaces Using Two-Layer Films of Electrochemically Polymerized Vinylpyridine and Vinylbipyridine Complexes of Ruthenium and Iron on Electrodes.
Technical rept.,
H. D. Abruna, P. Denisevich, M. Umana, Thomas J. Meyer, and Royce W. Murray. 14 May 80, 11p Rept no. TR-16
Contract N00014-76-C-0817
Pub. in Jnl. of the American Chemical Society, v103 n1 p1-5, 14 Jan 81.

No abstract available.

AD-A095 047/7 PC **A03**/MF **A01**
Case Western Reserve Univ., Cleveland, OH. Case Labs. for Electrochemical Studies.
Depolarized Rayleigh Light Scattering Studies of Concentrated Aqueous Nitrate Solutions.
Technical rept.,
Ronald A. Carpio, Mehmed Mehicic, and Ernest Yeager. 15 Dec 80, 41p Rept no. TR-47
Contract N00014-75-C-0557

Interferometric measurements of the reorientational relaxation time of the nitrate anion in concentrated aqueous calcium nitrate and zinc nitrate solutions have been made as a function of temperature and composition. Arrhenius plots of tau for Ca(NO3)2.X H2O, where X = 4, 5, and 5.6 and Zn(NO3)2.5 H2O are linear and yield activation energies in the range of 5.6 to 8.3 Kcal/mole. The data for Ca(NO3)2, which cover the most extensive range of viscosity and temperature, where non-Arrhenius and were best fitted by the Vogel-Tamman-Fulcher equation from which an ideal glass transition temperature was derived. The viscosity dependence of tau for both the Ca(NO3)2 and Zn(NO3)2 solutions was found to be between that predicted by the classical Stokes Einstein equation and that predicted using slip hydrodynamic boundary conditions. Nitrate rotation was found to be slower in Ca(NO3)2 solutions than in the corresponding Zn(NO3)2 solutions. (Author)

AD-A095 095/6 PC **A04**/MF **A01**
Case Western Reserve Univ., Cleveland, OH.
Recent Advances in the Sciences of Electrocatalysis.
Technical rept.,
Ernest Yedger. 1 Nov 80, 60p Rept no. TR-52
Contract N00014-75-C-0953
Presented at the Acheson Award Lecture at the National Meeting of the Electrochemical Society, Oct 80.

This paper was presented as the Acheson Award lecture at the national meeting of the Electrochemical Society in October 1980 and surveys recent developments in the field of electrocatalysis, including work in the author's laboratory, most of which was carried out with the support of ONR. The first part surveys techniques for obtaining information concerning electrode surfaces and particularly species adsorbed on such surfaces. Special attention is focused on in-situ optical techniques (ultraviolet, visible, infrared, Raman) and the use of ex-situ surface physics techniques, the latter in conjunction with electrochemical studies of single crystal electrode surfaces. The second part of the paper summarizes the present state of understanding of hydrogen and oxygen electrocatalysis. (Author)

AD-A095 134/3 PC **A03**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
Progress Report on Research into Chemical Structure/Bonding Decomposition Relationships for Energetic Materials.
Interim technical rept.,
R. Cameron Dorey, John S. Wilkes, Larry P. Davis, Henry L. Pugh, and W. Robert Carper. Dec 80, 37p Rept no. FJSRL-TR-80-0026

Photochemical and thermal decomposition of nitroaromatic compounds and nitramines has been studied by electron paramagnetic resonance spectroscopy. Radicals are obtained from both types of compounds, indicating a mechanism for their decomposition. Photolysis of nitroaromatics in ethers results in a radical produced with solvent interaction, whereas photolysis in other solvents and all photolysis of nitramines produces a radical formed by cleavage of a nitro group from the parent compound. Thermal decomposition studies have been undertaken using binary mixtures of compounds in the search for an inert high-temperature solvent. (Author)

AD-A095 136/8 PC **A03**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
The Use of Angle-Resolved Electron and Photon Stimulated Desorption for Surface Structural Studies.
Technical rept.,
Theodore E. Madey. 1 Feb 81, 27p Rept no. TR-12
Contract N00014-81-F-0021

We review recent experiments and models related to desorption processes induced by electrons and photons incident on surfaces. The utility of angle-resolved electron and photon-stimulated desorption of ions for studies of molecular structure at surfaces is emphasized. (Author)

ANL-80-58 PC **A03**/MF **A01**
Argonne National Lab., IL.
Cross Sections for Electron Inelastic Collisions with Argon.
E. Eggarter, and M. Inokuti. Jul 80, 33p
Contract W-31-109-ENG-38

A complete set of optical oscillator strengths and electron-impact cross sections for the argon atom is presented in tabular form. A large variety of experimental data and theoretical calculations was studied, and various checks based on theory (including the constraint of sum rules) were critically performed. Data were analyzed mainly by a semiempirical method that stresses the close relation of photoabsorption with electron-atom collisions. 5 tables. (ERA citation 06:008343)

BMFT-FB-ID-80-006 PC **A05**/MF **A01**
Bundesministerium fuer Forschung und Technologie, Bonn-Bad Godesborg (Germany, F.R.).
DECHEMA Data Bank: Retrieval Analysis and Calculation of Physical Property Data of Chemical Compounds and Mixtures.
R. Eckermann. Jul 80, 83p
In German.
U.S. Sales Only.

A computerbased data bank for chemical engineering is described which allows for a rapid online access to physical property data of chemical compounds and mixtures needed for the design and operation of chemical processes and plants. The data bank consists of three systems complying with the following requirements: 1. Flexible computerized storage and retrieval of any physical property data and of calculation methods for property data (Data Retrieval System, SDR). 2. Critical evaluation and analysis of physical property data (Data Analysis System, SDA). 3. Calculation of pure component and mixture data for any required state (Data Calculation System, SDC). (Atomindex citation 11:549655)

DESY-SR-79/28 PC **A02**/MF **A01**
Deutsches Elektronen-Synchrotron, Hamburg (Germany, F.R.).
Ion Pair from Photon Irradiation of O sub 2 , NO, and CO from 17 to 30 EV.
H. Oertel, H. Schenk, and H. Baumgaertel. Oct 79, 12p
U.S. Sales Only.

Relative photoionization efficiency curves of the fragment ions of O sub 2 , NO, and CO were determined in the energy region 17 eV to 30 eV by means of synchrotron radiation. The photoionization efficiency curves for O exp - and O exp + from molecular oxygen, for O exp - and N exp + from nitric oxide, and for O exp - and C exp + and C exp - from carbon monoxide were determined with a wavelength resolution of 0.2 nm. The data show predissociation structure in the ion pair formation region and autoionization structure in the region of dissociative ionization. Because the mass spectrometric determination of negative photoions exhibits a very low noise level, the investigation of ion pair formation processes provides considerable information on weak Rydberg series in the VUV energy region. (Atomindex citation 11:529418)

DOE/ER/06030-2 PC **A03**/MF **A01**
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.

Kinetic Study of Radical-Aromatic Hydrocarbon Reactions. Annual Progress Report No. 2, May 1, 1979-April 30, 1980.
A. R. Ravishankara, and F. P. Tully. 30 Apr 80, 49p
Contract AS05-78ER06030

A slow flow high temperature flash photolysis-resonance fluorescence apparatus which utilizes an all quartz reactor has been constructed. This apparatus has been used to measure absolute rate constants as a function of temperature and pressure for the reactions of OH radicals with the following prototype aromatic hydrocarbons; C sub 6 H sub 6 , C sub 6 D sub 6 , C sub 6 H sub 5 CH sub 3 , and C sub 6 D sub 5 CD sub 3 , in the temperature range of 213 to 1046 exp 0 K. Details of the kinetic investigations are described in this report. At present, the non-exponential OH decays that were obtained in the temperature range of 325 to 425 exp 0 K are being analyzed to extract both thermodynamic and kinetic information on the OH-Aromatic adduct. Concurrently attempts are being made to assign branching ratios for various reactive channels as a function of temperature using the measured kinetic isotope effects. (ERA citation 06:008032)

DOE/ER/10377-2 PC **A02**/MF **A01**
Utah Univ., Salt Lake City.
Fourier Transform Photoacoustic Kinetic Spectroscopy of Solid Surfaces. Annual Progress Report, April 1-December 10, 1980.
E. M. Eyring. Dec 80, 12p
Contract AC02-79ER10377

A description of visible Fourier transform photoacoustic spectroscopy (PAS) has been published in two places. Application of PAS to a zirconium phosphate inorganic system has also been described. The use of visible synchrotron radiation in quantitative high frequency PAS has been attempted, and a theoretical modeling of such experiments is nearing completion. A Nicolet FTIR spectrometer is being used to perform mid-infrared PA spectroscopy on carbon samples with a view to determining the best means of ratioing out variations with wavelength in infrared source intensity. (ERA citation 06:008001)

DOE/ER/10414-T1 PC **A02**/MF **A01**
SRI International, Menlo Park, CA.
Chemistry of Gaseous Lower Halides of Uranium. Technical Progress Report, 1 September 1979-1 April 1980.
D. L. Hildenbrand. 15 Apr 80, 18p
Contract AT03-79ER10414

The gaseous uranium species UF, UF sub 2 , UF sub 3 , and UF sub 4 were generated in effusion cell beams by vaporization of UF sub 4 (s) under reducing conditions, and they were identified and studied by mass spectrometry. From extensive second-law studies of reaction equilibria involving these species and several reaction partners used as reference standards, the individual bond dissociation energies and standard enthalpies of formation of the U-F species were derived. Reaction entropies derived from the slope data indicate that the electronic entropies of the U-F species are substantial, and are comparable to or larger than that of atomic uranium. Additional thermochemical measurements were made to establish the properties of several Ag and Cu monohalides that have been or will be used as reference standards in the uranium halide measurements. From studies of the sublimation and decomposition of uranyl fluoride, UO sub 2 F sub 2 (s), the enthalpy of sublimation of UO sub 2 F sub 2 (g), has been determined, and another gaseous oxyfluoride, UOF sub 4 (g), has been tentatively identified. The gaseous products of decomposition of UO sub 2 F sub 2 (s) observed by mass spectrometry differ from those postulated by other investigators, indicating that the mechanism of decomposition has not been clearly established. A search of the thermochemical literature on uranium halides has been completed. (ERA citation 06:008002)

DOE/ER/71294-T1 PC **A02**/MF **A01**
California Univ., Los Angeles. Dept. of Chemistry.
Preparation and Characterization of Ligand Types Intermediate in the Metal Catalyzed Conversion of Coal to Methane, Methanol, and Higher Alkanes and Alcohols. Second Technical Progress Report, September 1, 1979-February 28, 1981.
J. A. Gladysz. 10 Nov 80, 17p
Contract AT03-76ER71294

Mechanistic studies of anionic formyl complexes were made. The rate of decomposition of the formyl (CO) sub 4 Mn(COC sub 6 H sub 5)(CHO) exp - anion as a function of counter-ion and trialkylborane present was examined. The deuterated formyl (CO) sub 4 Mn(COC sub 6 H sub 5)(CDO) exp - was prepared and its decomposition was monitored by H exp 2 NMR. The data obtained indicate that the formyl decomposes by a disproportionative pathway not by initial CO loss, as commonly noted for formyl complexes. (ERA citation 06:008015)

DOE/EV/02386-19 PC **A05**/MF **A01**
New York Univ., NY. Radiation and Solid State Lab.
Interaction of Radiation with Matter. Research Progress Report, November 1, 1979-October 31, 1980.
Sep 80, 92p
Contract AS02-76EV02386

The mechanisms of dissipation of energy in organic and inorganic materials, and the application of the technique developed to a study of selected problems of environmental concern in the production of energy from fossil fuels were studied. In the Inorganic Phase of the work the research involves (1) measurements of cross-sections for K and L-shell ionization processes for heavy projectiles in the low velocity region, (2) experimental tests of target dependence of the effective-charge theory for light projectiles, (3) theoretical studies on the energy loss of swift particles in plasmas over a broad density and temperature range. The organic phase of the work falls into a series of closely related areas, all derived from a study of the interaction of radiation with matter. (1) New techniques for the study of small particulates (approx. 1 mu); composition, mass (to +-1 pg) and charge (+-1 electron) can be determined. (2) External photoelectric effects as a tool in arriving at the electronic structure of organic crystals. (3) The interaction of water with charge carriers in organic crystals, producing reactive chemical species, such as Oh and HSO sub 3 radicals. (4) Mechanisms of interaction of air-pollutant polycyclic aromatic carcinogens with DNA and the study of the conformation of the adducts. (ERA citation 06:008345)

DOE/EV/05784-3 PC **A02**/MF **A01**
Florida State Univ., Tallahassee. Inst. of Molecular Biophysics.
Selective Excitation, Relaxation, and Energy Channeling in Molecular Systems. Progress Report, December 1, 1979-November 30, 1980.
W. Rhodes. 1980, 10p
Contract AS05-78EV05784

The research described deals with theoretical aspects of selective excitation and energy channeling processes in (coupled) molecular systems. The effects of intra- and intermolecular interactions are considered for the response and relaxation properties of large and small molecules to excitation with light. Some of the more important physical processes and phenomena studied include the following: the nature of radiationless transitions in isolated molecules; the role of the exciting light characteristics in determining the structure of the prepared excited state of the molecule; resonance emission of molecules, including the distinctions between scattering and fluorescence on one hand and the nature of oscillatory vs dissipative limits of radiative relaxation on the other; coherent, nonlinear laser-driven phenomena; electronic spectral properties of biological macromolecules; and the effects of constant, uniform electric and magnetic fields on chemical relaxation kinetics. The role of stochastic modulation in the quantum-mechanical description of atomic and molecular events is emphasized. This report is descriptive in nature, with no data. 1 figure. (ERA citation 06:008346)

GSF-S-560 PC **A06**/MF **A01**
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich (Germany, F.R.). Inst. fuer Strahlenschutz.
Catalogue of Spectra for the Calibration of Dosemeters.
W. W. Seelentag, W. Panzer, G. Drexler, L. Platz, and F. Santner. Mar 79, 108p
U.S. Sales Only.

Generally, the catalogue should prove valuable for the comparison of the X-ray spectra used at the different national primary standard laboratories for different types of instruments, and the recommendations by international organisations. Be it due to these or other reasons, the demand for a previous catalogue had indicated to the authors the usefulness of a new, updated edition. (orig.) 891 ORU/ orig. 892 BRE. (Atomindex citation 11:531730)

INIS-mf-5766 PC **A05**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
Measurement of the Electronic Excitation of Atoms in Atom-Molecule Collisions Near Threshold.
D. Pust. Jul 79, 83p
In German.Thesis.
U.S. Sales Only.

In first part of the paper the measurement of scattering cross sections is described and the energy transfer in molecule-alkali systems is investigated. The influence of translational and vibrational energy could be separated near the excitation threshold. In the second part of the work measurements are reported on the electronic excitation of Xe in Xe-Xe-collisions. The experimental data are compared with theoretical calculations. (Atomindex citation 11:529427)

JEN-456 PC **A05**/MF **A01**
Junta de Energia Nuclear, Madrid (Spain).
Sampling System for Pulsed Signals. Study of the Radiative Lifetimes of Excited 3 exp 2 P1/2 and 3 exp 2 P3/2 States of Na, Excited by a Tunable Dye Laser.
J. Canpos, and P. Thomas. 1979, 77p
In Spanish.
U.S. Sales Only.

A system for sampling and averaging repetitive signals in the order of nanoseconds is discussed. The system uses as storage memory a multichannel analyzer operating in multiscaling mode. This instrument is employed for the measurement of atomic level lifetimes using a dye laser to excite the atoms and is applied to the study of lifetimes of the 3 exp 2 P1/2 and 3 exp 2 P3/2 states of sodium. (Atomindex citation 11:529350)

JINR-R-4-12710 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Potentials of the Coulomb Repulsion Between Electrons in the Diatomic Molecules in the Adiabatic Basis.
F. R. Vukajlovich, and O. A. Mogilevskii. 1979, 16p
In Russian.
U.S. Sales Only.

General expressions are obtained for the calculation of matrix elements of the Coulomb repulsion between electrons in the two-electron diatomic molecules using the adiabatic basis. Based on these formulae the algorithm is realized for calculating these matrix elements for hydrogen molecule in a wide range of internuclear distances. Our results are compared with the asymptotic calculations and previous calculations in the vicinity of equilibrium position. (Atomindex citation 11:529456)

KFKI-1980-15 PC **A02**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
Vapour Pressure Isotope Effect of the Equimolar H sub 2 O-D sub 2 O Mixture.
Gy. Jakli, and H. Illy. Apr 80, 13p
U.S. Sales Only.

Vapour pressure isotope effect (VPIE) of the equimolar H sub 2 O-D sub 2 O mixture in the temperature range 5 to 90 deg C was measured to investi-

gate the ideality ot the H sub 2 O-HDO-D sub 2 O system. For comparison the VPIE of the pure H sub 2 O-D sub 2 O system was redetermined on the same apparatus. (Atomindex citation 11:546380)

KFKI-1980-16 PC **A02**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
Ideal Behaviour of the Equimolar H sub 2 O-D sub 2 O Mixture.
Gy. Jakli, and G. Jancso. Apr 80, 13p
U.S. Sales Only.

New high precision vapour pressure data on equimolar H sub 2 O-D sub 2 O mixtures are analysed. The results show that the H sub 2 O-HDO-D sub 2 O liquid mixture can be considered as an ideal solution within the limits of the presently available data. The present investigation supports the earlier conclusion that the law of the geometric mean for the vapour pressure isotope effect in the series H sub 2 O, HDO and D sub 2 O is not obeyed. (Atomindex citation 11:546381)

KFKI-1980-20 PC **A02**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
Bibliography on Vapor Pressure Isotope Effects. Supplement 1.
G. Jancso. Apr 80, 22p
U.S. Sales Only.

The first Bibliography on Vapour Pressure Isotope effects covered the literature of the period from 1919 through December 1975. The present Supplement reviews the literature from January 1976 through December 1979. The bibliography is arranged in chronological order; within each year the references are listed alphabetically according to the name of the first author of each work. (Atomindex citation 11:546382)

LA-8534-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Automated Apparatus for Sieverts' Studies of Metal Hydrides.
D. H. W. Carstens, and W. R. David. Dec 80, 17p
Contract W-7405-ENG-36

An automated system, controlled by a small desktop computer, that carries out Sieverts' experiments on metal hydride systems is described. Data (equilibrium pressures versus temperatures at constant hydrogen-to-metal ratios) are recorded for later analysis and plotting. The computer also controls valve positions during the experiments. Results for two metal hydride systems, the uranium deuteride system in the plateau region and the La sub 5 sub 25 Ni hydride system at low concentrations, are presented as examples. Data included on the latter system have not been reported previously. The techniques used in Sieverts' experiments and the sources of errors are discussed. (ERA citation 06:007979)

LBL-11305 PC **A08**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Corrosion of Iron.
C. G. Law, Jr. Nov 80, 153p
Contract W-7405-ENG-48
Thesis.

In this dissertation three problems relevant to the electrochemical aspects of iron are treated. In the first problem, a model was developed for the anodic dissolution of iron in a sulfuric acid solution. Current and potential distribution validate experimentally obtained z-shaped polarization curves. In the second problem mass-transfer rates on rotating disks and rings are calculated when the flow regime may vary from laminar near the center to fully developed turbulent flow near the periphery. These results are subsequently used in a model which calculates corrosion rates on a disk rotating in sea water. On a completely different topic, the current and potential distributions on a dropping-mercury electrode are calculated below the limiting current. Results are generated in terms of two dimensionless parameters. (ERA citation 06:008030)

LBL-11885 PC **A15**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Selectivity in Multiple Quantum Nuclear Magnetic Resonance.
W. S. Warren. Nov 80, 347p
Contract W-7405-ENG-48
Thesis.

The observation of multiple-quantum nuclear magnetic resonance transitions in isotropic or anisotropic liquids is shown to give readily interpretable information on molecular configurations, rates of motional processes, and intramolecular interactions. However, the observed intensity of high multiple-quantum transitions falls off dramatically as the number of coupled spins increases. The theory of multiple-quantum NMR is developed through the density matrix formalism, and exact intensities are derived for several cases (isotropic first-order systems and anisotropic systems with high symmetry) to shown that this intensity decrease is expected if standard multiple-quantum pulse sequences are used. New pulse sequences are developed which excite coherences and produce population inversions only between selected states, even though other transitions are simultaneously resonant. One type of selective excitation presented only allows molecules to absorb and emit photons in groups of n. Coherent averaging theory is extended to describe these selective sequences, and to design sequences which are selective to arbitrarily high order in the Magnus expansion. This theory and computer calculations both show that extremely good selectivity and large signal enhancements are possible. (ERA citation 06:006767)

N81-16175/4 PC **A04**/MF **A01**
Hamilton Standard, Windsor Locks, CT.
Phase Diagram of KHF2 and Non-Equilibrium Effects.
Final Report.
M. C. Hobson, and J. D. Kellner. Oct 78, 55p
NASA-CR-152192, SVHSER-7206
Contract NAS2-9273

The equilibrium diagram for the KHF2-H2O system was constructed from cooling and heating curves for the compositions between 5 wt% and 40 wt% KHF2 and the results are shown. The phase diagrams shown is typical of that of a two component system with miscible liquid phases and whole solid phases consist of pure components. A eutectic point was found at approximately 15% KHF2 which remains completely liquid down to a temperature of -9.0 C. No hydrate formation was observed and no anomalous behavior such as the occurrence of solid transitions or metastable states was observed. The effect of rapid freezing on the equilibrium diagram did not appear, and cooling curves exhibited only one halt. Also, at rapid freezing rates, the supercooling of the solutions was smaller than those observed at the slow cooling rates. The existence of a eutectic composition and the slow rate of dissolution of the salt are used to interpret heat absorption behavior in practical applications of the KHF2-H2O system.

N81-16583/9 PC **A04**/MF **A01**
Ionics, Inc., Watertown, MA.
Anion Permselective Membrane.
Summary Report.
R. B. Hodgdon, and W. A. Waite. Nov 80, 54p
NASA-CR-165223, DOE/NASA/0137-1
Contracts DEN3-137, DE-AI04-80AL-12726

The efforts on the synthesis of polymer anion redox membranes were mainly concentrated in two areas, membrane development and membrane fabrication. Membrane development covered the preparation and evaluation of experimental membranes systems with improved resistance stability and/or lower permeability. Membrane fabrication covered the laboratory scale production of prime candidate membranes in quantities of up to two hundred and sizes up to 18 inches x 18 inches (46 cm x 46 cm). These small (10 in x 11 in) and medium sized membranes were mainly for assembly into multicell units. Improvements in processing procedures and techniques for preparing such membrane sets lifted yields to over 90 percent.

ORNL/TM-6593/R1 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Separations Systems Data Base: A Users' Manual. Revision I.
J. W. Roddy, and W. J. McDowell. Jan 81, 37p
Contract W-7405-ENG-26

A separations systems data base (SEPSYS), designed specifically for the retrieval of information needed in chemical separations problems (i.e., how to perform a given separation under given conditions), is described. Included are descriptions of the basic methods of searching and retrieving information from the data base, the procedure for entering records into the data base, a listing of additional references concerning the computer information process, and an example of a typical record. The initial entries are concerned primarily with liquid-liquid extraction and liquid-solid ion exchange methods for metal ions and salts; however, the data base is constructed so that almost any separation process can be accommodated. Each record is indexed with information provided under the following fields: author; title; publication source; date of publication; organization sponsoring the work; brief abstract of the work; abstract number if the work has been so referenced, and/or abstractors initials; type of separation system used (e.g., flotation); specific or generic name of the separation agent used (e.g., acetylacetone); list of substances separated (e.g., gold, copper); qualitative description of the supporting medium or matrix containing the substances before separation (e.g., nitrate); type of literature where the record was printed (e.g., book); and type of information that the article contains. Each of these fields may be searched independently of the others (or in combination), and the last six fields contain specific key words that are listed in the report. Definitions are provided for the 36 information terms. (ERA citation 06:008008)

PB81-139917
(Order as PB81-139859, PC **A05**/MF **A01**)
Beijing Univ. (China). Inst. of Physical Chemistry.
Nature of Resonance in Chemistry and Principle of Bond Type Variation,
Tang Youqi. 11 Apr 79, 5p
Included in Scientia Sinica, v25 n12 p 997-1001 Dec 80.

No abstract available.

PB81-139925
(Order as PB81-139859, PC **A05**/MF **A01**)
Anhui Inst. of Chemical Technology, Hefei (China).
Comments on the 'ABT-Concept',
Wu Ningsheng. 17 Apr 80, 3p
Included in Scientia Sinica, v25 n12 p1001-1004 Dec 80.

Recently, Kaiser developed the 'ABT-concept' and the real plate number of the chromatographic column. Kaiser considered the use of real plate number in evaluating the quality of chromatographic column to be preferrable to the theoretical plate number and the effective plate number. Kaiser's 'ABT-concept' (including his supplements) may be summarized as follows: Under strictly isothermal and isobaric elation conditions and proper operation (quick injection, nonoverloaded, correct detection and record), in making chromatograms of a group of homologous substances, the data of the peak width at half height and retention time of a series of peaks may be obtained.

PB81-139958
(Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
Theoretical Calculation of Force Constants and Normal Frequencies for CO2 Molecules,
Zhang Benzhi, and Shi Guangyu. 9 Feb 80, 5p
Included in Scientia Sinica, v25 n12 p1014-1018 Dec 80.

It is of fundamental importance to determine the normal frequencies of molecules in the research of atmospheric molecular spectroscopy. The normal frequencies are usually determined by laboratory measurement, while in this paper the force constants and the normal frequencies are computed by the use of the ab initio method in quantum chemistry. The theoretical results are in reasonable agreement with the experimental ones.

PB81-147308 PC **A02**/MF **A01**
Bureau of Mines, Avondale, MD. Avondale Research Center.
Well Engineering and Sampling Variables in the Evaluation of Geobrines.
Rept. of investigations/1980,
W. D. Riley, R. P. Walters, F. X. McCawley, G. R. Conner, and P. B. Needham, Jr. 1980, 25p
BUMINES-RI-8465

An analytical program has been conducted at the Avondale Research Center to determine the chemical constituents of some high- and low-salinity geobrines found in the Imperial Valley of California. Data are reported for the early stages of brine production of four geothermal wells--the low-salinity, medium-enthalpy brines from the East Mesa Known Geothermal Resource Area (KGRA), Mesa 6-1 and 6-2, and the high-salinity, high enthalpy brine from the Salton Sea KGRA, Magmamax 1 and Woolsey 1.

PB81-148710 PC **A02**/MF **A01**
Environmental Research Lab., Athens, GA.
Organophosphate and Organophosphorothionate Esters: Application of Linear Free Energy Relationships to Estimate Hydrolysis Rate Constants for Use in Environmental Fate Assessment.
Journal article,
N. Lee Wolf. c1980, 9p EPA-600/J-80-206
Pub. in Chemosphere, v9 p571-579 1980.

Hydrolysis rate constants required for assessing the environmental fate of certain organophosphate and organophosphorothionate esters may be estimated by use of linear free energy relationships (LFERs). LFERs for the second-order alkaline rate constants and the pKa of the conjugate acid of the leaving groups were established for 0,0-diethyl-0-substituted phosphates and phosphorothionates. Also, the second-order alkaline hydrolysis rate constants of selected triaryl phosphates were correlated with the Hammett-sigma constants. Existing LFERs for diaryl phosphate ester anions along with monoaryl phosphate ester mono- and dianions were used to predict hydrolytic half-lives under reaction conditions that are characteristic of aquatic environments. (Copyright (c) Pergamon Press Ltd. 1980.)

PB81-151474 PC **A17**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Ion Energetics Measurements. Part I. 1971-1973,
H. M. Rosenstock, D. Sims, S. S. Schroyer, and W. J. Webb. Sep 80, 379p NSRDS-NBS-63-PT-1
Library of Congress catalog card no. 80-607942.
Sponsored in part by National Inst. of General Medical Sciences, Bethesda, MD.

The present publication tabulates measurement information on energetics of gaseous positive ions published in 1972 and 1973 along with some information from 1971. It is intended to supplement the information previously compiled and evaluated in 'Energetics of Gaseous Ions.' Approximately five thousand measurements are tabulated, drawn from over six hundred published papers.

PB81-154452 Not available NTIS
National Bureau of Standards, Washington, DC.
Certification of Clinical and Environmental Trace Organic RM's.
Final rept.,
H. S. Hertz. 1980, 6p
Sponsored in part by Food and Drug Administration, Washington, DC., National Institutes of Health, Bethesda, MD., Environmental Protection Agency, Washington, DC., and Department of Energy, Washington, DC.
Pub. in Proceedings of International Symposium on the Production and Use of Reference Materials, Bundesanstalt fuer Materialpruefung (BAM), Berlin, Germany, November 13-16, 1979, Paper in Production and Use of Reference Materials, p393-398 1980.

The United States National Bureau of Standards has recently issued its first Standard Reference Material (SRM) for trace organic analysis (an RM for anticonvulsant drugs in serum). During the coming year, three additional trace organic SRMs will be issued: generator columns for producing saturated aqueous solutions of polynuclear aromatic hydrocarbons, a shale oil certified for several toxic organic compounds, and human serum certified for normal clinical analytes. The methods used for the accurate and precise trace organic analyses required for the certifications of these materials form the basis for this paper. The methods of greatest current utility include capillary column gas chromatography, high performance liquid chromatography, and isotope dilution gas chromatography-mass spectrometry.

PB81-154460 Not available NTIS
National Bureau of Standards, Washington, DC.
Photodetachment Spectroscopy of C2(-) Autodetaching Resonances.
Final rept.,
P. L. Jones, R. D. Mead, B. E. Kohler, S. D. Rosner, and W. C. Lineberger. 1980, 14p
Grants NSF-CHE78-18424, NSF-PHY79-04928
Pub. in Jnl. of Chemical Physics 73, n9 p4419-4432, 1 Nov 80.

The cross section for photodetachment of C2(-1) is investigated in the photon energy range 14000-20000 cm (1.75-2.5 eV). Sharp resonances due to autodetachment are observed at photon energies corresponding to transitions between high vibrational levels of the C2(-1) X 2 sup sigma (+)(g) state and high vibrational levels of the C2(-1) B 2 sup sigma (+)(u) states.

PB81-155657 Not available NTIS
National Bureau of Standards, Washington, DC.
What Really Does Happen to Electronically Excited Atoms in Flames.
Final rept.,
K. C. Smyth, P. K. Schenck, and W. G. Mallard. 1980, 7p
Pub. in Proceedings of the American Chemical Society Symposium Series No. 134, Laser Probes of Combustion Chemistry, Washington, DC., September, 1979, p175-181 1980.

In this paper the authors compare experimental results on the opto-galvanic spectra of high-lying d states in sodium with model calculations which incorporate ionization and quenching rates. The main conclusions are: (1) Hollander's 'low' rate constant for sodium ionization is sufficient to model the opto-galvanic signal magnitudes as a function of excitation energy. Abnormally high rates are not required. (2) Essentially all (greater than 90%) of the sodium atoms excited to n greater than or = to 7d are ionized at a flame temperature of 2000K. For n = 7 the energy needed for ionization 2249/cm, which is approximately 2kT (kT = 1390/cm).

PB81-155665 Not available NTIS
National Bureau of Standards, Washington, DC.
Prospectives for Surface Chemistry.
Final rept.,
J. T. Yates, Jr., and T. E. Madey. 1980, 29p
Pub. in Paper in ONR-37, Science, Technology, and the Modern Navy, Thirtieth Anniversary 1946-1976, p415-432 1976. Proceedings of Symposium on Fluid/Solid Surface Interactions, National Bureau of Standards, Gaithersburg, MD., October 18-20, 1978, p121-149 1980.

Recent historical developments in the field of surface chemistry are reviewed as a basis for future work within the field. The relationship of basic studies in surface chemistry and surface physics to technological applications is outlined.

PB81-155715 Not available NTIS
National Bureau of Standards, Washington, DC.
Shear Induced Phase Transitions in Simple Fluids.
Final rept.,
D. J. Evans, and H. J. M. Hanley. 29 Sep 80, 3p
Pub. in Jnl. Physics Letter 79A, n2-3 p178-180, 29 Sep 80.

Computer simulation indicates that the pressure of a fluid under shear is a function of the strain rate. The phase diagram will be dependent on the shear and, in particular, the critical point will be shifted. The effect is shown quantitatively for a Lennard-Jones fluid.

PB81-155723 Not available NTIS
National Bureau of Standards, Washington, DC.
Computer Simulation of an m-6-8 Fluid Under Shear.
Final rept.,
D. J. Evans, and H. J. M. Hanley. Sep 80, 11p
Pub. in Jnl. Physica (Utrecht) A 103, n1-2 p343-353 Sep 80.

A homogeneous shear nonequilibrium molecular dynamics algorithm has been applied to a system of 108 particles interacting with an m-6-8 potential. The viscosity was calculated at three densities corresponding approximately to the triple point, two-thirds melting and critical density. Comparing the results to argon data it appears that three body effects need to be considered at the higher densities. The variation of the viscosity and pressure with shear was noted. The viscosity behavior reinforces previous work with a Lennard-Jones fluid; the pressure behavior has not been reported before.

PB81-155764 Not available NTIS
National Bureau of Standards, Washington, DC.
Spectroscopic Studies of the Products of Reactions of Yttrium and Scandium Atoms with Halogen Molecules. I. The Origin of Chemiluminescence.
Final rept.,
H. C. Brayman, D. R. Fischell, and T. A. Cool. 1 Nov 80, 13p
Pub. in Jnl. of Chemical Physics 73, n9 p4247-4259, 1 Nov 80.

Observations of laser induced fluorescence from the products of the reactions of yttrium and scandium atoms with halogen molecules have shown that chemiluminescence does not originate from electronically excited metal monohalide molecules, as previously suggested, but instead arises from electronically excited dihalide molecules, MX(*)(2) Production of the metal dihalides appears to require the formation of vibrationally excited metal monohalides, (MX(+)), in a precursor reaction. Radiative lifetime measurements for chemiluminescent bands are presented.

PB81-155772 Not available NTIS
National Bureau of Standards, Washington, DC.
Theory of Two-Atom Coherence in Gases. I. Master Equations.
Final rept.,
A. Ben-Reuven. Dec 80, 13p
Pub. in Jnl. Physical Review A 22, n6 p2572-2584 Dec 80.

The response of a collision-broadened gas sample to driving coherent radiation is studied theoretically, taking into account effects of coherent excitations of two or more atoms (or molecules). In analogy to the Bloch-type master equation for one-atom coherences, describing the motion of a single atom 'dressed' by the relevant (incident and detected) field modes, a master equation is derived for two-atom coherences, including an effective interaction of the Bethe-Salpeter-type, accounting for the mutual interaction of the coherently driven pair. The master equation includes also all symmetrization effects owing to resonance exchange between identical atoms, and is limited to nonreactive gas atoms (or molecules) undergoing binary collisions, including otherwise all (internal and translational) relaxation effects. The self-energy kernels are expressed in a nonperturbative fashion, in terms of binary-collision scattering amplitudes, and include renormalization effects due to coincidence of radiative couplings with the collisions (optical and radiative collisions). The concept of two-atom coherences is generalized to higher coherence ranks by constructing a hierarchy of master equations, including vertex operators that upgrade or downgrade the coherence rank, as a prelude to a diagrammatic method for calculating continuous-wave spectra. This hierarchy is compared with prevalent Agarwal-type master equations, based on the Dicke pseudospin method, and used in the study of two-level atoms.

PB81-155780 Not available NTIS
National Bureau of Standards, Washington, DC.
Theory of Two-Atom Coherence in Gases. II. Continuous-Wave Spectra.
Final rept.,
A. Ben-Reuven. Dec 80, 13p
Pub. in Jnl. Physical Review A 22, n6 p2585-2597 Dec 80.

General expressions are derived for the spectral line shapes of resonance absorption and scattering of coherent radiation in collision-broadened gases, taking into account effects of coherent excitation of two or more atoms (or molecules), as steady-state solutions of a hierarchy of master equations described in a previous publication (paper I). Coupling between the coherent motions of the atoms, provided by a Bethe-Salpeter-type effective interaction, in the binary-collision approximation, forms the essential mechanism for introducing cooperative coherent effects into the steady-state spectra. Explicit expressions are given for the effects of two-atom coherence in the binary-collision approximation, in which the Bloch-type dressed-atom self-energy superoperator is modified by the presence of collisions in which both atoms retain memory of their coherent propagation before the collision. The self-energies include the effects of resonance exchange symmetrization in self-broadening, and are renormalized by the coincidence of radiative transitions during the collisions. The impact (near-resonance) and the quasistatic (line-wing) limits of the applied-frequency detunings are discussed. In the quasistatic limit, coherent many-atom excitations become irrelevant; however, interactions of both collision partners with the radiation during the collision accounts for such phenomena as collision-induced absorption or radiative collisions. In the impact limit, the inclusion of the Bethe-Salpeter interactions allows for the appearance of two-atom resonances. Magnitude estimates of these effects are discussed. Effects of higher-rank (many-body) coherences are formally discussed with the help of a diagrammatic method, leading into implicit bootstrap equations that can be solved by iterative or other procedures.

PB81-155798 Not available NTIS
National Bureau of Standards, Washington, DC.
Rayleigh Scattering from a Methane-Ethane Mixture.
Final rept.,
B. J. Ackerson, and H. J. M. Hanley. 15 Oct 80, 5p
Pub. in Jnl. Chemical Physics 73, n8 p3568-3572, 15 Oct 80.

The Rayleigh linewidth of a methane (71.07%)-ethane mixture was measured by dynamic light scattering near the plait point. Results are reported for the concentration diffusivity and (preliminary only) for the thermal diffusivity. It was found that a large background contribution is present in the concentration diffusivity, in agreement with theoretical predictions. The thermal diffusivity is compared to a one-fluid model introduced previously. A critical temperature of 236.36 + or - 0.03 K and a critical pressure of 6.66 + or - 0.02 MPa was determined for the mixtue.

PB81-156226 PC **A02**
East Carolina Univ., Greenville, NC.
Fluoride in the Ambient Air Over the Pamlico Estuary in North Carolina,
J. Wayne Chamblee, Frank Arey, J. Wayne Powell, and Edgar Heckel. Apr 80, 5p UNC-SG-162, NOAA-80120914
Pub. in Jnl. of the Air Pollution Control Association, v30 n4 p397-400 Apr 80.

The advent of the commercial fluoride ion-sensitive electrode during the last decade has provided a new and powerful analytical tool and, consequently, more attention has been devoted to pollution by fluoride. The North Carolina phosphate mining operations of Texasgulf, Inc., located on the south bank of the Pamlico River near Aurora, raise the possibility of fluoride contamination of the ambient air. The application of high-volume air samplers would not be feasible for monitoring fluoride in a field study in this area due to the unavailability of an AC power source. A report is made here on the development of a medium-volume air sampling technique and the associated analytic methods which permit the determination of fluoride in a mobile field laboratory. In addition, data are reported from 55 sampling runs which provide the necessary information on ambient fluoride levels in the vicinity of this eastern North Carolina phosphate mining operation.

PB81-156762 PC **A10**/MF **A01**
Colorado State Univ., Fort Collins. Dept. of Chemistry.
Environmental Effects of Western Coal Combustion. Part IV. Chemical and Physical Characteristics of Coal Fly Ash.
Final rept.,
David F. S. Natusch, and David R. Taylor. Nov 80, 218p EPA-600/3-80-093
Grant EPA-R-803950
See also Part 3, PB81-113615.

Coal fly ashes from different sources were extensively studied. Fly ash consists of as many as 12 different particle types, made up mainly of Si, Al, Ca, K, Na, and Fe. Many p potentially volatile trace elements (As, Se, Ga, In, Pb, Cd) are always preferentially associated with more respirable particles. Many other minor and trace elements may also show an inverse particle size dependence, depending on the coal fly ash. Elements showing no dependence include Al, Ba, Ca, Co, Fe, K, Mg, Rb, Sc, Si, Ta, Ti, and the rare earths. Many of the more volatile and potentially hazardous trace elements are surface associated. Most potentially hazardous inorganic species in fly ash can be leached into aqueous solution but are unlikely to give rise to solution concentrations of great concern. The physical and chemical characteristics and behavior of polycyclic organic matter (POM) associated with coal fly ash was also studied. Theoretical models show that adsorption of POM on coal fly ash will occur in seconds in a typical emission stream and that the process is highly temperature dependent. Surface-adsorbed POM is highly reactive to some nitrogen and sulfur oxides at levels expected to be found in power plumes. It was found that some POM absorbed on fly ash are stabilized aganist photochemical decomposition, while other compounds decompose readily upon adsorption. Although fly ash emitted to the atmosphere contains much more POM than precipitator ash, there is an insufficient amount to make a discernible impact on any terrestrial aquatic system.

PB81-158719 PC **A04**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Technical Activities 1980 Surface Science Division Reprinted from NBSIR 80-2132.
Final rept.,
C. J. Powell. Oct 80, 64p NBSIR-80-2166

This report summarizes technical activities of the NBS Surface Science Division during Fiscal Year 1980. These activities include experimental and theoretical research in surface science, the development of improved measurement methods, the provision of needed data, the development of reference materials, applications to important scientific and national problems, and surface-standards work. A listing is given of publications, talks, professional committee participation, and professional interactions by the Division staff.

PB81-160913 Not available NTIS
National Bureau of Standards, Washington, DC.
Reactions of (CO2)2+ and (CO)2+ Association Ions.
Final rept.,
L. W. Sieck. 1978, 32p
Sponsored in part by National Aeronautics and Space Administration, Washington, DC.
Pub. in International Jnl. of Chemical Kinetics 10, p335-366 1978.

The reactions of (CO2)2(+1) and (CO)2(+1) with various additives have been investigated using the NBS high-pressure photoionization mass spectrometer at total pressures of 0.4-1.0 torr of either CO2 or CO. The additives include CH4, CD4, C2H2, O2, H2O, 15,14N2O, and CO in both CO2 and 13CO(2).

PB81-160947 Not available NTIS
National Bureau of Standards, Washington, DC.
Spectroscopic Studies of the Products of Reactions of Yttrium and Scandium Atoms with the Halogen Molecules. II. Laser Induced Fluorescence from Yttrium and Scandium Monohalides.
Final rept.,
D. R. Fischell, H. C. Brayman, and T. A. Cool. 1 Nov 80, 13p
Sponsored in part by Air Force Office of Scientific Research, Bolling AFB, DC.
Pub. in Jnl. of Chemical Physics 73, n9 p4260-4272, 1 Nov 80.

Excitation spectra from the monohalides of yttrium and scandium were recorded with the laser induced fluorescence method. Spectroscopic constants and radiative lifetimes were determined for several previously unobserved electronic states. Computer generated spectral simulations were used for the determination of spectroscopic constants and Franck-Condon factors associated with the fluorescence band systems.

PB81-160954 Not available NTIS
National Bureau of Standards, Washington, DC.
Thermodynamics of Metastable Equilibria.
Final rept.,
J. W. Cahn. Nov 80, 11p
Sponsored in part by Defense Advanced Research Projects Agency, Arlington, VA.
Pub. in Proc. of Rapid Solidification Processing (2nd): Principles and Technologies, Reston, VA, Mar. 23-26, 1980, p24-34 Nov 80.

The thermodynamics of metastable phase equilibrium is closely related to that of stable phase equilibrium. Metastable phase equilibrium can often be presented by extensions of the curves on phase diagrams that represent stable phase equilibria. Thermodynamic principles rank phase equilibria but not phases in a hierarchy of increasing stability. Thermodynamics imposes precursor rules in multicomponent systems in which a prior reaction is required before a phase can appear. A given hierarchy persists over a domain on the phase diagram bounded by surfaces on which the ranking of two equilibria changes. Multicomponent phases per sec. do not form a hierarchy because a given phase can disappear and reappear in a sequence of spontaneous processes. Processing for producing metastable phases must place the system within a domain in which the desired phases can form spontaneously from the available phases.

PB81-167215 PC **A03**/MF **A01**
Albany International Research Co., Dedham, MA.
Development of Hollow Fiber Reverse Osmosis Membranes.
Final rept.,
Daniel K. Schiffer, Robert B. Davis, Myron J. Coplan, and Charles E. Kramer. No. 30, 40p W81-01652, OWRT,-C-90266-D(9531)(1)
Contract DI-14-34-0001-9531

Work conducted under this contract is a continuation of the development of a hollow fiber reverse osmosis composite membrane. Five systems (sulfonated polysulfone, piperazine phthalamide, immobilized zirconium, chemically bound tannins, and direct membrane formation) were investigated as replacements for the polyfuran membrane developed during contract 14-34-0001-7551. Sulfonated polysulfone was the most promising and enough membranes were prepared for testing in small module form at OWRT-Roswell. Testing indicates that SPS is a stable membrane with tolerance to aggressive feeds, such as 50C seawater and pH 8, 100 ppm active chlorine.

PB81-170607 PC **A06**/MF **A01**
Burns and Roe, Inc., Paramus, NJ.
Development of Improved Cleaning and Surface Regeneration Methods and Economic Analysis of These Methods for Seawater Membranes.
31 Jan 81, 113p W81-01757, OWRT-C-90183-D(9524)(1)
Contract DI-14-34-0001-9524

Seawater membranes having deteriorated salt rejection through partial loss of the desalting layer are regenerated to approach their initial rejection through the application of chemical agents. The agents include water dispersible resins, surfactants, other colloids and organic acids. The effectiveness of a regenerating agent is a function of (a) type of membrane material; (b) initial level of salt rejection, and (c) flow conditions. At optimum additive concentration, the membrane quality parameter, square A/B increases. For an agent to sustain its effect for a long period, it should be capable of some specific interaction with the membrane such as hydrogen bonding. In all cases studied, it is cost effective to clean and regenerate rather than replace modules. However, in some cases, replacement is recommended.

PB81-858961 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Born Approximation in Electron Collisions. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 89p NERACSPNNT3081

This retrospective bibliography contains citations concerning the Born Approximation in theoretical and experimental studies and analyses of the collisions of electrons with atoms, ions, and molecules. Interaction cross sections, excitation, ionization, emissions, and elastic and inelastic scattering are considered for the various types of electron collisions. (Contains 80 citations, fully indexed and including a table of contents.)

SORI-EAS-78-409 PC **A05**/MF **A01**
Southern Research Inst., Birmingham, AL.
Energy by Reverse Electrodialysis. Final Report.
14 Jul 78, 86p
Contract AC05-77OR05544

The principles and history of converting the difference between the chemical potentials of concentrated and dilute salt solutions to useful energy by reverse electrodialysis (RED) are discussed. The potential sources of brines discussed include the brines of oil and natural gas fields, the brines from flooding of salt domes, the brines of salt lakes, seawater, and geothermal brines. Equations for predicting the performance of RED units are presented and discussed. A study of the effects of variables on power output from RED cells is given, and estimates of capital and operating costs of RED power units are detailed. (ERA citation 06:007213)

7E. Radio and Radiation Chemistry

DOE/ER/10392-3 PC **A02**/MF **A01**
Illinois Univ. at Urbana-Champaign. School of Chemical Sciences.
Excited State Electron Transfer in Systems with a Well-Defined Geometry.
K. J. Kaufmann. Dec 80, 10p
Contract AC02-79ER10392

The effect of temperature, dielectric strength and ligand on the structure of the mesopyropheophorbide cyclophanes will be studied. ESR, NMR, emission and absorption spectroscopy, as well as circular dichroism will be used. The changes in structure will be correlated with changes in the photochemical activity. Electron acceptors such as benzoquinone will be utilized to stabilize the charge separation. Charge separation in porphyrin quinone dimers will also be studied. It was found that electron transfer in the cyclophane system is relatively slow. This is presumably due to an orientation requirement for fast electron transfer. Solvent dielectric also is important in producing a charge separation. Decreasing the temperature effects the yield of charge transfer, but not the kinetics. (ERA citation 06:008033)

DOE/ER/10601-1 PC **A02**/MF **A01**
Texas A and M Univ., College Station. Dept. of Chemistry.
Photochemical Solar Energy Conversion in Surfactant Vesicles. Annual Proress Report.
J. H. Fendler. 1980, 5p
Contract AS05-80ER10601

This first annual report lists the personnel, journal publications, oral presentations, and summarizes the scientific activities for the period March 1, 1980 to November 30, 1980. The following are the highlights of these activities: 1) The neodynium-yag laser system has been installed; 2) based on this laser, a nanosecond flash photolysis system has been constructed; 3) water soluble 5,10,15,20-tetra-p-sulfonatophenyl zincporphyrin and 5,10,15,20-tetra-p-N-methyl-pyridinochloride zincporphyrin were synthetized, purified and characterized; and photosensitized electron transfer, charge separation and hydrogen production have been demonstrated in surfactant vesicles. (ERA citation 06:007140)

LA-8603-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Plutonium Isotopic Composition by gamma-Ray Spectroscopy.
S. T. Hsue, T. E. Sampson, J. L. Parker, S. S. Johnson, and D. F. Bowersox. Nov 80, 14p
Contract W-7405-ENG-36

We discuss the general approach, computerized data analysis methods, and results of measurements to determine the isotopic composition of plutonium by gamma-ray spectroscopy. The simple techniques are designed to be applicable to samples of arbitrary size, geometry, chemical and isotopic composition that have attained exp 241 Pu- exp 237 U equilibrium. The combination of the gamma spectroscopic measurement of isotopic composition coupled with calorimetric measurement of total sample power is shown to give a totally nondestructive determination of sample Pu mass with a precision of 0.6% for 1000-g samples of PuO sub 2 with 12% exp 240 Pu content. The precision of isotopic measurements depends upon many factors including sample size, sample geometry, and isotopic content. Typical ranges are found to be exp 238 Pu, < 1 to 10%; exp 239 Pu, 0.1 to 0.5%; exp 240 Pu, 2 to 5%; exp 241 Pu, 0.3 to 0.7%; exp 242 Pu (determined by isotopic correlation); and exp 241 Am, 0.2 to 10%. (ERA citation 06:008007)

LBL-11456 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Surface Aspects of Hydrogen Photogeneration on Titanium Oxides.
F. T. Wagner, S. Ferrer, and G. A. Somorjai. Jul 80, 27p CONF-8010142-1
Contract W-7405-ENG-48
American Chemical Society symposium on photoeffects at semiconductor-electrolyte interfaces, Golden, CO, USA, 15 Oct 1980.

The hydroxide concentration dependence of the rate of hydrogen production in SrTiO sub 3 systems is discussed in light of surface analytical results. The surface elemental composition before and after illumination in various aqueous electrolytes has been monitored with Auger electron spectroscopy and is compared with the composition obtained by ultrahigh vacuum surface preparation techniques. The effects of surface platinization on photoactivity are discussed and evidence for a thermal reaction between Pd and TiO sub 2 surfaces is given. No Auger detectable changes in surfaces composition correlate with the higher rates of hydrogen photogeneration on metal-free SrTiO sub 3 observed in highly concentrated aqueous alkaline electrolyte. Platinized crystals and photoelectrochemical cells show similar enhancement of photoactivity at high hydroxide concentrations. Although no hydrogen photogeneration is seen from water vapor at pressures up to 20 Torr on crystals near room temperatures, hydrogen photogeneration does occur on pre-reduced crystals at temperatures where oxygen diffusion into the bulk is rapid. Kinetics of hole-transfer or hydroxylation may determine the overall reaction rate at zero applied potential. Carbon states lying within the SrTiO sub 3 forbidden gap may mediate charge transfer in some photochemical reaction systems, and intermetallic compound formation may alter the catalytic properties of directly metallized titaniferous semiconductors. (ERA citation 06:007085)

LBL-11480 PC **A11**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Chemistry of HO sub 2 NO sub 2 and the Photochemistry of the HO/sub X/-NO/sub X/-CO/sub X/ System.
D. Littlejohn. Aug 80, 247p
Contract W-7405-ENG-48
Thesis.

The objectives of this work were: (1) to investigate formation and destruction reactions of peroxynitric acid, HO sub 2 NO sub 2 , particularly formation by the gas phase reaction of H sub 2 O sub 2 and N sub 2 O sub 5 , and destruction by attack of OH radical, and (2) to study the photochemistry and kinetics of the HO/sub x/-NO/sub x/-CO/sub x/ system by observing the response of species to photolytic light in a mixture of H sub 2 O sub 2 , NO sub 2 , CO and O sub 2 . Investigations were done using infrared spectroscopy to observe the behavior of species involved with the reactions of interest. Several techniques were used, including expansion of reactants into an evacuated cell, static cell decays under constant illumination, and periodic of flow systems. Infrared absorption cross sections were obtained for CO, CO sub 2 , NO, NO sub 2 , N sub 2 O sub 5 , HNO sub 3 , H sub 2 O sub 2 , and H sub 2 O. The spectroscopic measurements were used to derive kinetic information on the systems under study. The reaction of H sub 2 O sub 2 with N sub 2 O sub 5 has previously been studied only in the liquid phase. This study investigated the reaction of gaseous H sub 2 O sub 2 and N sub 2 O sub 5 in the temperature range of 253 exp 0 K to 283 exp 0 K and a pressure range of 10 torr to 80 torr. The reaction occurred primarily heterogeneously in the apparatus in which it was studied. The upper limit for the bimolecular reaction giving the products H sub 2 O sub 2 + N sub 2 O sub 5 implies HNO sub 4 + HNO sub 3 was determined to be k < 1 x 10 exp -18 cm exp 3 molecule exp -1 second exp -1 . The products of the reaction of OH with HNO sub 4 were determined to be OH + HNO sub 4 implies H sub 2 O + NO sub 2 + O sub 2 and the rate constant for the reaction was found to be 2.9 +- 1.0 x 10 exp -12 cm exp 3 molecule exp -1 over the temperature range of 263 exp 0 K to 283 exp 0 K. The decay profiles of species in the static cell photolysis of NO sub 2 , H sub 2 O sub 2 and CO in 0.1 and 1.0 atmosphere of O sub 2 were observed and compared with numerical simulations. (ERA citation 06:008017)

ND-R-276(W) PC **A02**/MF **A01**
UKAEA, Risley (England). Nuclear Power Development Establishment.
Oxygen Potentials of Usub(0.77)Pusub(0.23)0SUB(2+-X) in the Temperature Range 1523-1822K.
G. R. Chilton, and J. Edwards. Mar 80, 17p
U.S. Sales Only.

Oxygen potentials for Usub(0.77)Pusub(0.23)0sub(2+-x) have been measured at four temperatures between 1523 and 1822 exp 0 K using a thermogravimetric technique. Additional measurements made on UOsub(2+x) and Usub(0.69)Pusub(0.31)0sub(2+-x) are compared with previously published data. (Atomindex citation 11:546542)

ORNL/TM-7568 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Assay of Brines for Common Radiolysis Products.
C. S. MacDougall. Jan 81, 42p
Contract W-7405-ENG-26

Brines are assayed for four common products of radiolytic reaction. Free chlorine is determined spectrophotometrically after reaction with o-tolidine. The test is specific for chlorine, and quantities of chlorine from 0.1 to 6 mu g in the test aliquot are determined with a precision of about +- 5%. Hydrogen peroxide is reacted with xylenol orange and determined spectrophotometrically with a precision of +- 5% on 2- mu g quantities of peroxide. A spectrophotometric method using thiocyanate is employed in the chlorate assay. After subtracting the bias caused by any H sub 2 O sub 2 or Cl sub 2 , 1- mu g quantities of chlorate can be determined with a precision of +- 10%. Perchlorate ion quantities of 1 ppM can be determined directly in brines by ion chromatography with a precision of about +- 15%. (ERA citation 06:008009)

UCID-18837 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Laser Cleanup of Pt Group Metals.
H. L. Chen. 26 Oct 80, 8p
Contract W-7405-ENG-48

Due to increasing interest in chemical and fuel synthesis from syngas, the feasibility and practicality of purifying Pt group metals (Pd, Ru, Rh) using LIS technologies have been re-evaluated. Findings for the selective removal of exp 107 Pd from Pd metal are described here. The selectivity of this technique is based on the angular momentum selection rules for atomic absorption of circularly polarized light. In principle, it is possible to selectively

excite isotopes with non-zero nuclear spin, using two circularly polarized laser pulses, while leaving the isotopes with zero nuclear spin unexcited. The excited atom can then be ionized using a third photon of appropriate energy. (ERA citation 06:006332)

8.

EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

AD-A094 845/5 PC **A03**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.
A Survey of the Spiny Lobster (Panulirus interruptus) Population in San Diego Bay, California. An Impact Study of Pier Construction Activities.
Final rept. Mar-Jul 79,
H. W. Goforth, Jr., and S. C. U'Ren. 15 Apr 80, 38p Rept no. NOSC/TR-542

Recent pier construction activity in San Diego Bay necessitated an evaluation of its impact on the spiny lobster (Panulirus interruptus). Lobster movements were monitored by placing standard commercial lobster traps at sixteen selected stations in San Diego Bay. Various data were recorded and lobsters were tagged and subsequently released. This report documents the findings of the study. (Author)

AD-A094 915/6 PC **A02**/MF **A01**
Scripps Institution of Oceanography, La Jolla, CA.
Cadmium in Halobates micans from the Central and South Atlantic Ocean,
M. Schulz-Baldes, and L. Cheng. 8 Jul 80, 9p
Contract N00014-75-C-0152
Pub. in Marine Biology, v59 p163-168 1980.

No abstract available.

AD-A094 967/7 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Neogene Radiolarian Events of the Tropical Pacific: A Catalog of Magnetostratigraphic Calibrations,
F. Theyer, C. Y. Mato, and S. R. Hammond.
1978, 12p Rept no. HIG-CONTRIB-900
Contract N00014-75-C-0209, Grant NSF-DES74-19504
Pub. in Proceedings of the Working Group Meeting, Biostratigraphic Datum-Planes of the Pacific Neogene (2nd), p89-98 1978.

No abstract available.

AD-A095 038/6 PC **A02**/MF **A01**
Woods Hole Oceanographic Institution, MA. Dept. of Biology.
An Apparatus for the Measurement of Grazing Activity of Filter Feeders at Constant Food Concentrations.
Technical rept.,
Scott M. Gallager, and Roger Mann. 4 Jan 81, 15p Rept nos. WHOI-81-7, WHOI-CONTRIB-4460
Contract N00014-79-C-0071
Pub. in Marine Biology Letters, v1 p341-349 1980.

No abstract available.

IVL-B-537 PC **A03**/MF **A01**
Swedish Water and Air Pollution Research Lab., Fryksta.
Dispersal and Effects of the Antonio Gramsci Oil Spill in the Stockholm Archipelago.
M. Notini, J. Mattsson, and O. Linden. Feb 80, 32p
In Swedish.

In February 1979 the Russian tanker Antonio Gramsci grounded outside Lettland; 6000 tons of oil were spread in the Baltic. A part of this was passed to the Swedish coast by easterly winds. Effects of the oil have been studied. The greatest effects were observed on organisms living by the seashore, especially crustaceans, which were in direct contact with the oil. The oil had been in the water quite a long time before it reached the Swedish coast. The most poisoning components (volatile aromatics) were not present, and the effects were limited. In some places cleaning caused damages because of the steam used. Fish from the area contained more oil than normal. In mussels there was no excess oil. (ERA citation 06:004522)

PB81-144941
(Order as PB81-144909, PC **A06**/MF **A01**)
National Marine Fisheries Service, Woods Hole, MA. Northeast Fisheries Center.
Biological Considerations Relevant to the Management of Squid ('Loligo pealei' and 'Illex illecebrosus') of the Northwest Atlantic,
A. M. T. Lange, and M. P. Sissenwine. Aug 80, 17p NOAA-80112805-4
Included in Marine Fisheries Review, v42 n7-8 p23-38, Jul-Aug 80.

The general biology and distribution of squid (Loligo pealei and Illex illecebrosus) in the northwest Atlantic are reviewed based on previous literature and observations from research and commercial catches.

PB81-147019 PC **A11**/MF **A01**
National Fish and Wildlife Lab., Gainesville, FL.
Abundance, Distribution and Use of Power Plant Effluents by Manatees ('Trichechus manatus') in Brevard County, Florida.
Final rept. Jan 78-Feb 80,
Susan H. Shane. 1 Jan 81, 250p FWS/WO-156
Sponsored in part by Florida Power and Light Co., Miami.

Brevard County, on Florida's east coast, contains one of the largest concentrations of manatees remaining in Florida. This population was studied from January 1978 through February 1980 using aerial surveys, and boat and land observations. As many as 250 manatees were counted in the county in the spring of 1979. During the warm months most manatees were observed in the Banana River, but during the winter most manatees (up to 100) were found in the warm effluent zones of two power plants on the Indian River. Declining air and water temperatures were significantly correlated with increases in the number of manatees in the power plant effluents. Manatees rely heavily upon these power plants as winter refuges, and plant shut-downs could prove disastrous for these animals.

PB81-153439 PC **A04**/MF **A01**
Maine State Dept. of Marine Resources, Augusta.
Environmental Physiology of Northern Shrimp (Pandalus borealis).
Completion rept. Aug 79-Jul 80,
Alden P. Stickney, and Herbert C. Perkins. Dec 80, 59p NOAA-80123108

Several laboratory experiments with shrimp (Pandalus borealis) larvae were conducted to estimate (1) the minimum daily number of food items (Artemia nauplii) required to be captured and ingested to insure survival, (2) the probabilities for one larva to capture that minimum ration at two temperature levels and three food densities, and (3) the minimum concentration of an algal food (Thalassiosira pseudonana) necessary to insure survival. Field samples were collected in Sheepscot Bay, Maine during February through March to determine the abundance and time of peak abundance of shrimp larvae, the abundance of planktonic food and the chlorophyll-a content of the water. The abundance and duration of both the shrimp larval swarms and the planktonic food was greater in 1980 than in the two previous years, indicating the dependence of the former on the latter for survival. A prototype bottom temperature monitoring buoy was tested in 250 feet of water, and after a few minor problems were corrected, performed satisfactorily.

PB81-153942 PC **A11**/MF **A01**
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
Pacific Seaweed Aquaculture, Proceedings of a Symposium on Useful Algae Held at Hopkins Marine Station of Stanford University, Pacific Grove, CA. on March 6-8, 1980,
Isabella A. Abbott, Michael S. Foster, and Louise F. Eklund. 1980, 230p NOAA-80122303

The purpose of the symposium on Pacific Seaweed Aquaculture was to draw together workers who could poll information on growing and using seaweeds, particularly in developing countries of the Pacific basin. It is here that many of the world's most useful seaweeds grow and where unemployment is high.

PB81-155376 PC **A02**
North Carolina Univ. at Wilmington. Dept. of Biology.
Field and Culture Studies of 'Porphyra rosengurtii' Coll et Cox (Rhodophyta, Bangiales) from North Carolina,
D. F. Kapraun, and D. G. Luster. 22 Oct 79, 12p UNC-SG-161, NOAA-80120915
Pub. in Botanica Marina, v23 p449-457 1980. Prepared in cooperation with North Carolina State Univ. at Raleigh. Dept. of Botany.

The life history of Porphyra rosengurtii was studied in the field and laboratory culture. Cross-gradient light-temperature culture in 8:16, 12:12, and 16:8 LD cycles was utilized to investigate the effects of light intensity, temperature, and daylength on growth and reproduction of both the conchocelis and blade phase. Conchospore and monospore formation in conchocelis appeared to be under photoperiod control, while spore formation in blades appeared to be controlled by total light energy. Results of these studies were used to explain the observed seasonal periodicity of growth and reproduction on the North Carolina coast.

PB81-157992
(Order as PB81-157984, PC **A16**/MF **A01**)
Bernice P. Bishop Museum, Honolulu, HI.
A Survey of Ciguatera at Enewetak and Bikini, Marshall Islands, with Notes on the Systematics and Food Habits of Ciguatoxic Fishes,
John E. Randall. Oct 79, 50p NOAA-80120401-1
Included in Fishery Bulletin, v78 n2 p201-249 Apr 80.

A total of 551 specimens of 48 species of potentially ciguatoxic fishes from Enewetak and 256 specimens of 23 species from Bikini, Marshall Islands, were tested for ciguatoxin by feeding liver or liver and viscera from these fishes to mongooses at 10% body weight. The species selected were all ones for which toxicity can be expected.

PB81-158008
(Order as PB81-157984, PC **A16**/MF **A01**)
Virginia Inst. of Marine Science, Gloucester Point.
Callinectes (Decapoda:Portunidae) Larvae in the Middle Atlantic Bight, 1975-77,
Peter O. Smyth. Apr 80, 16p CONTRIB-952, NOAA-80120401-2
Included in Fishery Bulletin, v78 n2 p251-265 Apr 80.

Distribution of Callinectes larvae in surface and subsurface shelf waters in the Middle Atlantic Bight was determined from quarterly zooplankton collections taken during a 2-year study. Observations confirmed the presence in offshore waters of a large larval pool from which recruitment may take place.

PB81-158024
(Order as PB81-157984, PC **A16**/MF **A01**)
National Marine Fisheries Service, Miami, FL. Southeast Fisheries Center.

Development and Structure of Fins and Fin Supports in Dolphin Fishes 'Coryphaena hippurus and Coryphaena equisells' (Coryphaenidae),
Thomas Potthoff. Nov 79, 39p CONTRIB-80-03M, NOAA-80120401-4
Included in Fishery Bulletin, v78 n2 p277-314 Apr 80.

The development and structure of the fins and fin supports were studied from a cleared and stained size series of about 400 Coryphaena hippurus and about 400 C. equiselis. Coryphaena hippurus and C. equiselis differ in all aspects of fin ray and fin support development.

PB81-158032
(Order as PB81-157984, PC **A16**/MF **A01**)
Scripps Institution of Oceanography, La Jolla, CA.
Larval Development of 'Euphausia eximia' (Crustacea: Euphausiacea) with Notes on Its Vertical Distribution and Morphological Divergence Between Populations,
Margaret D. Knight. Dec 79, 24p NOAA-80120401-5
Included in Fishery Bulletin, v78 n2 p311-335 Apr 80.

The purpose of this paper is to describe the larval development of E. eximia in the reproductive area of the California Current. Differences are observed in morphology of larvae from the South Equatorial-Peru Current population and apparent variation within each population in rate of growth.

PB81-158040
(Order as PB81-157984, PC **A16**/MF **A01**)
Florida State Univ., Tallahassee. Dept. of Biological Science.
Feeding Ecology of 'Lagodon rhomboides' (Pisces: Sparidae): Variation and Functional Responses,
Allan W. Stoner. Dec 79, 17p NOAA-80120401-6
Included in Fishery Bulletin, v78 n2 p337-352 Apr 80.

Five major ontogenetic stages were found in the diet of pinfish, Lagodon rhomboides, from Apalachee Bay, Florida. Ontogenetic pattern in food habits was primarily a function of mouth size and changing dentition of the predator. Plant-animal and predator-prey relationships change continually; however, the life history of L. rhomboides is well adapted to seasonal patterns of productivity in food organisms.

PB81-158057
(Order as PB81-157984, PC **A16**/MF **A01**)
Smithsonian Institution, Washington, DC. Div. of Mammals.
Observations on a Mass Stranding of Spinner Dolphin, 'Stenella longirostris', from the West Coast of Florida,
James G. Mead, Daniel K. Odell, Randall S. Wells, and Michael D. Scott. Oct 79, 9p NOAA-80120401-7
Included in Fishery Bulletin, v78 n2 p353-360 Apr 80.

The spinner dolphin, Stenella longirostris, while well known in portions of the Pacific Ocean, has rarely been available for study in the Atlantic. Data from 28 individuals from a mass stranding in Florida enabled the authors to make preliminary estimates of mean size and age at sexual and physical maturity, reproductive seasonality, and sexual dimorphism for this species in the southwest Atlantic.

PB81-158065
(Order as PB81-157984, PC **A16**/MF **A01**)
California Univ., Santa Barbara. Dept. of Biological Sciences.
Annual Variability of Reef-Fish Assemblages in Kelp Forests off Santa Barbara, California,
Alfred W. Ebeling, Ralph J. Larson, William S. Alevizon, and Richard N. Bray. Oct 79, 18p NOAA-80120401-8
Grants NOAA-2-352-8-6, NOAA-04-3-158-22
Included in Fishery Bulletin, v78 n2 p361-377 Apr 80.

Assemblages of kelp-bed fishes that live in and about the kelp canopy or over the reef bottom were censused by movie strips (cinetransects) every September from 1971 to 1974 at rock reefs off Santa Barbara, southern California. Cinetransects provided an adequate and efficient way to estimate species composition (order of relative or ranked species abundances), diversity, and numbers of fish for yearly comparisons between canopy and bottom habitats at mainland and Santa Cruz Island study sites.

PB81-158073
(Order as PB81-157984, PC **A16**/MF **A01**)
Washington Univ., Seattle. Coll. of Fisheries.
Ceratioid Anglerfishes of the Philippine Archipelago, with Descriptions of Five New Species,
Theodore W. Pietsch, and Jeffrey A. Seigel. Oct 79, 22p CONTRIB-540, NOAA-80120401-9
Included in Fishery Bulletin, v78 n2 p379-399 Apr 80.

Ceratioid anglerfishes of the Philippine Archipelago represent 10 of 11 ceratioid families, 22 genera and 42 species, 5 species of which are newly described forms of the genus Oneirodes (Oneirodidae). All known records of ceratioids are listed with keys to families, genera, and species represented in the area.

PB81-158081
(Order as PB81-157984, PC **A16**/MF **A01**)
Oregon State Univ., Corvallis. School of Oceanography.
Eggs and Larvae of Butter Sole, 'Isopetta isolepis' (Pleuronectidae), Off Oregon and Washington,
Sally L. Richardson, Jean R. Dunn, and Nancy Anne Naplin. Dec 79, 18p NOAA-80120401-10
Grant NOAA-04-6-158-44094
Included in Fishery Bulletin, v78 n2 p401-417n Apr 80.

Development of butter sole, Isopsetta isolepis, is described from egg through benthic juvenile, based on reared and field-collected specimens. Larvae are abundant in nearshore coastal waters off Oregon and Washington in winter and spring.

PB81-158099
(Order as PB81-157984, PC **A16**/MF **A01**)
Lawler, Matusky and Skelly Engineers, Pearl River, NY.
Retention of Three Taxa of Postlarval Fishes in an Intensively Flushed Tidal Estuary, Cape Fear River, North Carolina,
Michael P. Weinstein, Sidney L. Weiss, Ronald G. Hodson, and Lawrence R. Gerry. Nov 79, 19p NOAA-80120401-11
Prepared in cooperation with North Carolina State Univ., Raleigh. Dept. of Zoology.
Included in Fishery Bulletin, v78 n2 p419-436 Apr 80.

Fixed nets were used to sample postlarvae of spot, Leiostomus xanthurus, Atlantic croaker, Micropogonias undulatus, and flounders, Paralichthys spp., over several 24-hour periods in the Cape Fear River, near Wilmington, North Carolina. Results of analyses of variance on abundance data collected at two locations indicate that these taxa exhibit distinct behavioral responses, primarily to photoperiod and tide, which allow them to maintain a selected position in the estuary and avoid being flushed seaward.

PB81-158107
(Order as PB81-157984, PC **A16**/MF **A01**)
Moss Landing Marine Labs., CA.
Relationships Between Wave Disturbance and Zonation of Benthic Invertebrate Communities Along a Subtidal High-Energy Reach in Monterey Bay, California,
John S. Oliver, Peter N. Slattery, Larry W. Hulberg, and James W. Nybakken. Nov 79, 19p NOAA-80120401-12
Included in Fishery Bulletin, v78 n2 p437-454 Apr 80.

Benthic marine invertebrate communities were organized along a gradient of wave-induced substrate motion on the subtidal high-energy beach in Monterey Bay, California. Two general zones were distinguished from 6 to 30 m of water. A shallow zone contained sediments that were commonly disrupted by wave activity and it was primarily occupied by small, mobile, deposit-feeding peracarid and ostracod crustaceans. Patterns of crustacean morphology and mobility were related to their depth zonation.

PB81-158115
(Order as PB81-157984, PC **A16**/MF **A01**)
State Univ. of New York at Stony Brook. Dept. of Ecology and Evaluation.
Daily Time of Spawning of 12 Fishes in the Peconic Bays, New York,
Steven P. Ferraro. Oct 79, 11p NOAA-80120401-13
Grant NOAA-2-35281
Included in Fishery Bulletin, v78 n2 p455-464 Apr 80.

Diel spawning periodicity occurs throughout the spawning season in 11 of 12 fishes studied in the Peconic Bays, New York. Some possible causes of diel spawning periodicity are reproductive synchronism between the sexes, deleterious effects of sunlight on embryogenesis, and parent or embryo predator avoidance.

PB81-158131
(Order as PB81-157984, PC **A16**/MF **A01**)
National Marine Fisheries Service, La Jolla, CA. Southwest Fisheries Center.
Percentage of Starving Northern Anchovy, 'Engraulis mordax', Larvae in the Sea as Estimated by Histological Methods,
Charles P. O'Connell. Oct 79, 16p NOAA-80120401-15
Included in Fishery Bulletin, v78 n2 p475-489 Apr 80.

The proportion of starving larvae of northern anchovy, Engraulis mordax, was estimated for the Southern California Bight in March 1977 from histological examinations of larvae for 64 1 m net tow samples. The number of larvae in the tows varied from 0 to about 400. Temperature and plankton volume data indicate that the patches were associated with fluctuating environmental conditions. The samples indicate that about 8% of northern anchovy larvae in the Southern California Bight were starving.

PB81-158156
(Order as PB81-157984, PC **A16**/MF **A01**)
San Diego Zoo, CA. Research Dept.
Is Ovulation in Dolphins, 'Stenella longirostris' and 'Stenella attenulata', Always Copulation-Induced,
K. Benirschke, Mary L. Johnson, and Rolf J. Benirschke. Oct 79, 22p NOAA-80120401-17
Prepared in cooperation with California Univ. at San Diego, La Jolla.
Included in Fishery Bulletin, v78 n2 p507-528 Apr 80.

This study of 58 nonpregnant uteri and ovaries of the spinner dolphin, Stenella longirostris, and the spotted dolphin, S. attenuata, was undertaken to ascertain whether ovulation is copulation-induced (reflex) or occurs spontaneously. Control specimens of immature, pregnant, and lactating females were examined also and were used to define the normal reproductive events in uteri and ovaries of these species. No differences were found between the two species.

PB81-158313 PC **A04**/MF **A01**
North Carolina Univ. at Wilmington. Dept. of Biology.
Management of Colonial Waterbirds, Summary Proceedings of a Workshop Held in Wilmington, North Carolina on 17-19 May 1979,
James F. Parnell, and Robert F. Soots, Jr. Jul 80, 61p UNC-SG-80-06, NOAA-80123001
Grant NA79AA-D-00048

A Workshop held in Wilmington, North Carolina on 17-19 May 1979, was designed to bring a group of colonial waterbird specialists together with repre-

sentatives of agencies involved either directly or indirectly with the management of colonial waterbirds. A program was designed to provide the group with current summaries of recent colonial waterbird population studies and current management efforts at private, state, and federal levels. Summaries of the four working sessions and the recommendations of the summary panel constitute the body of this report.

PB81-165532 PC **A04**/MF **A01**
Georgia Marine Science Center, Savannah.
The Distribution of the Hard Clam 'Mercenaria mercenaria' (Linne) and Clam Predators in Wassaw Sound, Georgia.
Randal L. Walker, Michael A. Fleetwoor, and Kenneth R. Tenore. Nov 80, 66p TRS-80-8, NOAA-81010702
Grant NOAA-04-7-158-44126
Prepared in cooperation with Skidaway Inst. of Oceanography, Savannah, GA.

In Wassaw Sound, Georgia, the hard clam Mercenaria mercenaria occurred in four habitats at different densities. In all habitats, clams were most abundant in intertidal areas. Juvenile clams were noticeably absent from all habitats, possibly due to abnormally low salinities which occurred in spring of 1977 through 1979 or heavy predation. Whelks, drills, rays, and crabs, especially the blue crab, Callinectes sapidus preyed upon clams.

8B. Cartography

AD-A094 738/2 PC **A02**/MF **A01**
Defense Mapping Agency Hydrographic/Topographic Center, Washington, DC.
Defense Mapping Agency Inertial Positioning System Test Results (2nd),
Harry C. Harris. Nov 80, 13p
Presented at the FIG International Congress (16th), 9-18 Aug 81, Montreux (Switzerland).

In 1979, the U.S. Defense Mapping Agency received its second inertial surveying system, which was built for DMA by Honeywell, Inc. The system has undergone extensive field testing in both a vehicle and a helicopter. This paper describes the system, details the field test procedures, and describes the results that have been obtained with this new system. The operational evaluation of the system includes many static and dynamic tests under various conditions and scenarios, designed to answer the classical questions such as effect of length of travel time between zero velocity updates and between survey update points, value of single versus double runs, sensitivity to directional changes, and comparison of results obtained in a vehicle and a helicopter.

AD-A094 935/4 PC **A03**/MF **A01**
Defense Mapping Agency, Washington, DC.
Research and Development Items at the Defense Mapping Agency (DMA),
Robert A. Penney. 10 Dec 80, 32p

This report covering significant Research and Development (R&D) activities of the Defense Mapping Agency (DMA) is prepared on an annual basis. The following general functional areas are covered in the report: (1) Geodesy and Geophysics; (2) Hydrography; (3) Elevation Data Collection; (4) Feature Analysis. (Author)

AD-A094 978/4 Not available NTIS
Durham Univ. (England). Dept. of Geography.
General Geomorphometry, Derivatives of Altitude, and Descriptive Statistics,
Ian S. Evans. 1972, 38p
Availability: Pub. in Spatial Analysis in Geomorphology, p17-90 1972 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A095 156/6 PC **A03**/MF **A01**
Army Engineer Topographic Labs, Fort Belvoir, VA.
Topographic Relaxation Study.
Final rept.,
Marsha Jo Hannah. 15 Sep 79, 48p Rept no. ETL-0209

Digital terrain models produced by computer correlation of stereo images are likely to contain occasional gross errors in terrain elevation. These errors typically result from having mismatched subareas of the two images, a problem which can occur for a variety of image-and terrain-related reasons. Such elevation errors produce undesirable effects when the models are further processed, and should be detected and corrected as early in the processing as possible. IAC has developed algorithms to detect and correct errors in digital terrain models. These algorithms focus on the use of constraints on both the allowable slope and the allowable change in slope in local areas around each point. Relaxation-like techniques are employed in the iteration of the detection and correction phases to obtain best results. (Author)

8C. Dynamic Oceanography

AD-A095 036/0 PC **A03**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Survey of Techniques for Measuring Currents Near the Ocean Surface.
Technical rept.,
J. R. McCullough. 1980, 27p Rept no. WHOI-81-5
Contract N00014-76-C-0197
Pub. in Air-Sea Interaction, p105-126 1980.

No abstract available.

AD-A095 037/8 PC **A02**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Equatorial Currents in the Western Indian Ocean.
Technical rept.,
J. R. Luyten, M. Fieux, and J. Gonella. 6 Feb 80, 11p Rept nos. WHOI-81-6, WHOI-CONTRIB-4521
Contract N00014-76-C-0197, Grant NSF-ATM78-21491
Pub. in Science, v209 p600-603, 1 Aug 80.

No abstract available.

PB81-148793 PC **A03**/MF **A01**
Johns Hopkins Univ., Baltimore, MD. Chesapeake Bay Inst.
Wind-Driven Circulation in the Potomac River.
Final rept.,
Dong-Ping Wang. Dec 80, 39p PPSP/PPRP-40

In a two-year study of the wind-driven circulation in the Potomac River, the author has developed the field data base and a two-dimensional circulation model, for the Chesapeake Bay/Potomac River System. Simultaneous current measurements were obtained in winter 1977, in the lower Potomac and at the river-bay junction, to determine the local wind forcing as well as the bay influence. The numerical model includes the important features of semi-implicit integration and multiple branches, which allows efficient and flexible simulation of the river-bay circulation.

PB81-154171 PC **A05**/MF **A01**
Woodward-Clyde Consultants, Houston, TX.
Shoreface - Surf Zone Sediment Exchange Processes and Shoreface Dynamics.
Technical memo.,
Alan W. Niedoroda. Oct 80, 99p NOAA-TM-OMPA-1, NOAA-80123107
Contract NOAA-03-6-022-35113

Detailed field experiments were conducted during the summers of 1976 and 1977 to determine the ocean kinematics and dynamics which dominate bedload sediment transport in a typical shoreface environment off Tiana Beach, Long Island, New York. The main purpose of this study was to obtain sufficiently detailed information on the geometry of the shoreface, sediments of the shoreface, and fluid shear stresses acting on the shoreface to permit calculations of bedload sediment transport under various typical conditions.

PB81-158339 PC **A04**/MF **A01**
National Geophysical and Solar-Terrestrial Data Center, Boulder, CO.
Catalog of Tsunami Photograph,
John B. Nelson. Oct 80, 58p KGRD-13, NOAA-80122304
Key to Geophysical Records Documentation no. 3.

Photographs of tsunami waves and resulting damage are a unique form of data that record a natural phenomenon extremely difficult to reduce to a written report. The Photographs listed in this catalog are all tsunami and earthquake related. They cover nine events occurring during the period 1946-75.

8E. Geodesy

AD-A094 991/7 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
The New Gravity System. Changes in International Gravity Base Values and Anomaly Values,
George P. Woollard. 3 Oct 77, 15p Rept no. HIG-CONTRIB-963
Contract N00014-75-C-0209
Pub. in Geophysics, v44 n8 p1352-1366 Aug 79.

No abstract available.

8F. Geography

AD-A094 652/5 PC **A06**/MF **A01**
Army Military Personnel Center, Alexandria, VA.
Assessing Man's Impact on Wetlands,
G. E. Galloway, Jr. Dec 80, 115p
Also available as Rept. no. UNC-WRRI-78-136 and Rept. no. UNC-SG-78-17.

Document provides background discussions of Federal interest in wetlands and summary of evaluation techniques used in the Government and private sectors to evaluate the impacts of various activities on the wetland environment. The characteristics of an ideal evaluation system are defined and a Wetland Evaluation System (WES) is described. The Wetland Evaluation System is applied in abbreviated case studies to cnstruction in the Yazoo Basin in Mississippi and the Neuse River Estuaries of North Carolina. Typical outputs of the WES are provided. (Author)

AD-A094 816/6 PC **A04**/MF **A01**
Rome Air Development Center, Griffiss AFB, NY.
The Significance of Data Collection Parameters when Utilizing Radar and Digital Terrain Models to Locate Terrain Features.
Robert H. Brock, Jr., and Donald I. Zulch. Nov 80, 55p Rept no. RADC-TR-80-312

the combination of cartographic and hypsographic data with radar data can generate the location of terrain features in the ground reference system. The significance of selected data collection parameters used in this task is investigated in three phases: (1) The development of deterministic radar models from given digital terrain models and varying radar parameters. (2) The perturbation of the terrain feature coordinates which result from errors in radar position, radar orientation, range, and resolution. (3) A factorial analysis of the terrain feature errors to establish the significance of the main fixed factors and their interactions. The main factors are azimuth from radar to terrain feature, range, resolution, terrain height and coordinate. The results indicate that the order of greatest to least importance for the factors is coordinate, range, resolution, terrain height and azimuth. (Author)

8G. Geology and Mineralogy

AD-A094 654/1 PC **A03**/MF **A01**
Connecticut Univ., Groton. Marine Sciences Inst.
Gravity and Crustal Structures in the Southern Beaufort Sea (North of Alaska).
Final rept.,
Peter Dehlinger. Sep 80, 33p
Contract N00014-75-C-0714

The purpose of this investigation was to (1) obtain geophysical measurements in open waters of the southern Beaufort Sea (north of Alaska), (2) determine from these measurements and from other data crustal structures that extend across the continental margin and into the adjacent abyssal plain, and (3) interpret the structural features in terms of the tectonic development of the region. The field work was conducted aboard U.S. Coast Guard cutters (ice breakers) during their summer field seasons north of Alaska, when the ships were available cost free for the project measurements. Our program was, in turn, restricted to work that could be conducted aboard ice breakers. The project was initiated on 1 April 1972 and completed 30 June 1979; field measurements were made during the summer field seasons of 1972 through 1977, as ice conditions permitted. The extent of open-waters varied greatly from year to year (and could not be estimated in advance). In 1977, ice conditions were most favorable; the southern limit of the ice pack was nearly 600 km north of the shore in eastern Alaska and we then obtained a large amount of useful measurements. In 1975 and 1976 conditions were least favorable; the ice pack extended almost to the shore and we obtained few useful measurements. Previous geophysical work in the Beaufort Sea includes (1) a regional gravity survey (with an estimated 15 mgal uncertainty) made on sea ice over the entire Beaufort Sea (the Canada Basin) and most of the Arctic Ocean in the 1960s by a group from the University of Wisconsin.

AD-A094 954/5 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Neogene Relative Motion between the Pacific Plate, the Mantle, and the Earth's Spin Axis,
Stephen R. Hammond, David Epp, and Fritz Theyer. 28 Jul 78, 5p Rept no. HIG-CONTRIB-955
Contract N00014-75-C-0209, Grant NSF-DES74-19504
Pub. in Nature, v278 n5702 p309-312, 22 Mar 79. Sponsored in part by Grants NSF-OCE76-02187, NSF-OCE77-20050 and NSF-OCE76-82056.

No abstract available.

AD-A094 956/0 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Lychnocanoma bandyca N.Sp., A New, Stratigraphically Important, Late Eocene Radiolarian,
C. Y. Mato, and F. Theyer. 1980, 6p
Contracts N00014-70-A-0016, N00014-75-C-0209
Pub. in Cushman Foundation Special Publication, Memorial to Orville L. Bandy, n19 p225-229 1980.

No abstract available.

AD-A094 974/3 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Tectonics of the Eastern Central Pacific Basin,
Theodore L. Orwig, and Loren W. Kroenke. 31 Jul 78, 17p Rept no. HIG-CONTRIB-795
Contracts N00014-70-A-0016, N00014-75-C-0209
Pub. in Marine Geology, v34 p29-43 1980.

No abstract available.

AD-A094 975/0 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Age and Chemistry of Volcanic Rocks Dredged from Jingu Seamount, Emperor Seamount Chain,
G. Brent Dalrymple, and Michael O. Garcia. 1980, 10p Rept no. HIG-CONTRIB-1045
Contract N00014-75-C-0209
Pub. in Initial Reports of the Deep Sea Drilling Project, v50 p685-693 1980.

No abstract available.

AD-A094 976/8 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Mineralogy of Deep-Sea Sediments along the Murray Fracture Zone,
Pow-Foong Fan. 15 Feb 79, 8p Rept no. HIG-CONTRIB-995
Contract N00014-70-A-0016
Pub. in Pacific Science, v33 n2 p213-221 1979.

No abstract available.

AD-A094 993/3 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
Observations of Flexure and the State of Stress in the Oceanic Lithosphere.
Journal article,
A. B. Watts, J. H. Bodine, and M. S. Steckler. 13 Nov 79, 9p Rept no. LDGO-3014
Contract N00014-75-C-0210, Grant NSF-OCE77-07941
Pub. in Jnl. of Geophysical Research, v85 nB11 p6369-6376, 10 Nov 80.

No abstract available.

AD-A094 996/6 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
Magma Chamber and Mantle Reflections - East Rise.
Journal article,
Thomas J. Herron, Paul L. Stoffa, and Peter Buhl. 21 Jul 80, 6p Rept no. LDGO-3051
Contract N00014-80-C-0098
Pub. in Geophysical Research Letters, v7 n11 p989-992 Nov 80.

No abstract available.

AD-A094 997/4 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Crust and Upper Mantle Structure Along the Flank of Koko Seamount,
K. Furukawa, J. F. Gettrust, L. W. Kroenke, and J. F. Campbell. 16 Jan 80, 12p Rept no. HIG-CONTRIB-1060
Contract N00014-75-C-0209
Pub. in Bulletin of the Seismological Society of America, v70 n4 p1161-1169 Aug 80.

No abstract available.

CONF-8006140-(V.1) PC **A23**/MF **A01**
Luleaa Univ. (Sweden).
Application of Rock Mechanics to Cut-and-Fill Mining.
May 80, 529p
Conference on application of rock mechanics to cut-and-fill mining, Luleaa, Sweden, 1 Jun 1980.
U.S. Sales Only.

The conference on application of rock mechanics to cut-and-fill mining was held June 1-3, 1980, at the University of Luleaa, Sweden. The conference began with reviews of the application of rock mechanics to mining and back filling in Australia, Canada and the USA. More particular papers involved mines in Sweden, Italy, Australia (pre reinforcement of walls with steel cables cemented in) and at the Con Mine in Canada. Two papers involved backfill material and specifications. Eight papers involved the use of the mathematical models for calculating the stresses developed in the rock mass by computer calculations and therefore, the probable stability. Such calculations are particularly necessary in deep mines. Papers of general interest were entered individually into EDB. (ERA citation 06:008326)

CONF-8006140-(V.2) PC **A14**/MF **A01**
Luleaa Univ. (Sweden).
Application of Rock Mechanics to Cut-and-Fill Mining.
May 80, 317p
Conference on application of rock mechanics to cut-and-fill mining, Luleaa, Sweden, 1 Jun 1980.
U.S. Sales Only.

The conference on application of rock mechanics to cut-and-fill mining was held June 1-3, 1980, at the University of Luleaa, Sweden. The papers in this volume deal almost entirely with the Naesliden project in Sweden. Stress measurements were made on the rock mass before and during mining and complex computer codes using the finite element method developed to calculate the strains and their changes as mining developed. Major problems involved the effects of joints and the mechanical properties of the hydraulic backfill and in corporating these items in the calculations. Most papers were entered individually into EDB. (ERA citation 06:008327)

CONF-8006140-(V.3) PC **A15**/MF **A01**
Luleaa Univ. (Sweden).
Application of Rock Mechanics to Cut-and-Fill Mining.
May 80, 342p
Conference on application of rock mechanics to cut-and-fill mining, Luleaa, Sweden, 1 Jun 1980.
U.S. Sales Only.

The conference on application of rock mechanics to cut-and-fill mining was held June 1-3, 1980, at the University of Luleaa, Luleaa, Sweden. Basic rock mechanics investigations of interest involving improving the support characteristics of backfilling by adding cement, compacting, and water removal have been entered individually into EDB. The papers also cover measurements of the support capability of such fills and the application of deformation measurements and calculations using finite element computer codes to the mining of particular ore bodies, including changes in the calculations as the mining progressed. (ERA citation 06:008328)

DOE/ET/27001-8 PC **A13**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Geological Sciences.
Evaluation and Targeting of Geothermal Energy Resources in the Southeastern United States. Progress Report, October 1, 1979-June 30, 1980.
J. K. Costain, and L. Glover, III. Dec 80, 298p
Contract AC05-78ET27001

A separate abstract was prepared for each of the eleven papers included in this report. Two summaries of papers were listed by title. (ERA citation 06:007613)

DOE/ET/28354-1/1 PC **A08**/MF **A01**
Analytic Sciences Corp., Reading, MA.
Hypothesis Testing for Resource Evaluation: An Application to Geothermal Potential Estimation in Nevada.
J. T. Parr. Oct 78, 158p
Contract AC02-76ET28354

A hypothesis testing methodology for the statistical integration of diverse data types has been further investigated. In an earlier study the technique was developed and applied, with limited data, to evaluation of the geothermal potential of Nevada. That effort has been extended in this report to include the implementation of data on major lineaments and surface lithology. Information from the new data bases is integrated with that from the seismicity and small scale linear data previously studied. The new data added in this study has improved the results considerably. A number of new areas appropriate for further, more detailed geophysical investigation are indicated by high likelihood ratios. (ERA citation 06:007605)

DOE/ID/12011-1 PC **A04**/MF **A01**
North Dakota State Natural Resources Council, Bismarck.
Area Development Plan of the Geothermal Potential in Planning Region 8, Roosevelt - Custer Area.
Jul 80, 68p
Contract FC07-79ID12011

Geothermal resource data, the Roosevelt-Custer Region development plan, and energy, economic, and institutional considerations are presented. Environmental considerations and water availability are discussed. (ERA citation 06:007606)

DOE/ID/12079-19 PC **A08**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.

Thermal Studies in a Geothermal Area: Report I. Thermal Studies at Roosevelt Hot Springs, Utah; Report II. Heat Flow Above an Arbitrarily Dipping Plane of Heat Sources; and Report III. A Datum Correction for Heat Flow Measurements Made on an Arbitrary Surface.
W. R. Wilson, and D. S. Chapman. Oct 80, 151p
Contract AC07-79ID12079

Separate abstracts were prepared for the three reports included in this volume on the interpretation of heat flow data in a geothermal area. (ERA citation 06:007622)

DOE/ID/12079-20 PC **A04**/MF **A01**
Utah Univ. Research Inst., Salt Lake City.
MT3D: A 3 Dimensional Magnetotelluric Modeling Program (User's Guide and Documentation for Rev. 1).
C. Nutter, and P. E. Wannamaker. Nov 80, 54p
ESL-47
Contract AC07-79ID12079

MT3D.REV1 is a non-interactive computer program written in FORTRAN to do 3-dimensional magnetotelluric modeling. A 3-D volume integral equation has been adapted to simulate the MT response of a 3D body in the earth. An integro-difference scheme has been incorporated to increase the accuracy. This is a user's guide for MT3D.REV1 on the University of Utah Research Institute's (UURI) PRIME 400 computer operating under PRIMOS IV, Rev. 17. (ERA citation 06:007626)

DOE/ID/12079-5 PC **A05**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Controlled-Source Audiomagnetotellurics in Geothermal Exploration. Topical Report.
S. K. Sandberg, and G. W. Hohmann. Sep 80, 96p
Contract AC07-79ID12079

Theoretical and field tests indicate that the controlled-source audiomagnetotelluric (CSAMT) method provides an efficient means of delineating the shallow resistivity pattern above a hydrothermal system. Utilizing a transmitter overcomes the main limitation of conventional AMT: variable and unreliable natural source fields. Reliable CSAMT measurements can be made with a simple scalar receiver. Calculations for a half-space show that the plane wave assumption is valid when the transmitter is more than 3 skin depths away in the broadside configuration and more than 5 skin depths away in the collinear configuration. Three dimensional numerical modeling results for a bipole source 5 skin depths away compare well with those for a plane wave source, showing that the method is valid. Comparisons between 2D and 3D model results show that a 2D MT program can be used to interpret CSAMT data. A CMAST survey at the Roosevelt Hot Springs KGRA produced apparent resistivity contour maps at four frequecies: 32, 98, 977, and 5208 Hz. These maps show the same features as a first-separation dipole-dipole resistivity map. Detailed CSAMT data was also collected at 10 frequencies on two profiles. Two-dimensional MT modeling (TM mode) of the resulting pseudosections yields models similar to those derived by modeling the dipole-dipole resistivity data. However, CSAMT resolved details not shown by the resistivity modeling. (ERA citation 06:007620)

GJBX-258(80) PC **A14**/MF **A01**
Arizona Univ., Tucson. Dept. of Geosciences.
Cordilleran Metamorphic Core Complexes and Their Uranium Favorability. Final Report.
P. J. Coney, and S. J. Reynolds. Nov 80, 324p
Contract AC13-76GJ01664

The objective of this report is to provide a descriptive body of knowledge on Cordilleran metamorphic core complexes including their lithologic and structural characteristics, their distribution within the Cordillera, and their evolutionary history and tectonic setting. The occurrence of uranium in the context of possibility for uranium concentration is also examined. Chapter 1 is an overview of Cordilleran metamorphic core complexes which describes their physical characteristics, tectonic setting and geologic history. This overview is accompanied by a tectonic map. Chapter 2 is a discussion of the mantled gneiss dome concept. The purpose of including this work is to provide a basic history of this concept and to describe the characteristics and distribution of gneiss domes throughout the world to enable one to compare and contrast them with the metamorphic core complexes as discussed in this report. Some gneiss domes are known producers of uranium (as are also some core complexes). Chapter 3 is an examination of the effects of the core complex process on adjacent sedimentary and volcanic cover terranes. Also included is a discussion of the kinematic significance of these cover terranes as they are related to process within the cores of the complexes. Some of the cover terranes have uranium prospects in them. Chapter 4 is a detailed discussion of uranium in Cordilleran metamorphic core complexes and includes the conceptual basis for the various types of occurrences and the processes that might favor concentration of uranium. The report is supported by a 5-part Appendix. The majority of the core complexes discussed in this report either do not appear or are not recognizable on existing published geologic maps. (ERA citation 06:005775)

INIS-mf-5763 PC **A02**/MF **A01**
Laboratorium voor Isotopen-Geologie, Amsterdam (Netherlands).
Z.W.O. Laboratory for Isotopic Geology. Summarized Report of Activities in the Year September 1978 to September 1979.
1 Sep 79, 21p
In Dutch.
U.S. Sales Only.

Summaries of the 14 most important research projects performed during the reporting year are presented. These are mainly concerned with isotope dating using Rb-Sr, K-Ar and U-Pb systems. Publications on this work are listed. Activities in mineralogy and mineral separation, X-ray analysis, chemistry, mass spectrometry, alpha spectrometry and fission-track dating are outlined. Information is also included on the laboratory personnel, speeches and papers, foreign trips and fieldwork, colloquia and receptions, foreign vistors and finance. (Atomindex citation 11:532370)

LA-UR-80-3523 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Geochemical Behavior of the Second Hot Dry Rock Geothermal Reservoir at Fenton Hill, New Mexico.
C. O. Grigsby, P. E. Trujillo, Jr., D. A. Counce, and R. G. Aguilar. 1980, 8p
Contract W-7405-ENG-36

The results of three major heat-extraction experiments conducted in two hot dry geothermal reservoirs indicate that the field chemistry is largely influenced by the interstitial fluid contained in the reservoir rock. This fluid is slowly removed by the circulation of relatively fresh water through the fracture systems until the level of dissolved species is ultimately fixed by rock-water equilibrium. Because the sodium and potassium observed in the system were contributed by the pore-fluid, the Na-K-Ca geothermometer was insensitive to changes in the rock temperatures. The quartz geothermometer does reflect the changes in reservoir temperature, however the concentraton of silica in solution must be adjusted for the effect of mixing of small amounts of silica-saturated pore-fluid with fluid which has passed through the main flow path. When the pore-fluid contribution is subtracted, the resulting concentration of silica in the produced fluid can be modeled with a kinetic model to determine the actual temperature of the reservoir rock. (ERA citation 06:007628)

LA-8419-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Research and Development Related to the Nevada Nuclear Waste Storage Investigations. Progress Report, January 1-March 31, 1980.
B. M. Crowe, and K. Wolfsberg. Oct 80, 25p
Contract W-7405-ENG-36

Results for sorption of americium on tuff for 6-month batch contact time are reported. Preliminary results for a batch experiment in which the strontium concentration is varied indicate a decrease in sorption ratio with increasing strontium concentration. Some of the crushed rock column elutions are exhibiting nonideal behavior. Work with solid rock columns and materials characterization is continuing. The logic controller for the automated x-ray diffractometer is operational. Samples from drill holed UE25A-1 and J-13 were rerun and cross-checked with the new equipment. A newly developed cathodoluminescence technique proved not to be effective in the identification of zeolite phases. Zeolite heating tests have begun to characterize the crystal chemistry of dehydration and breakdown reactions of common zeolite phases with heating at one atmosphere. Significant weight and volume loss occurs in clinoptilolite and heulandite-bearing tuff upon heating above 100 exp 0 C. Geologic mapping and sampling of basaltic volcanic rocks within the southern Death Valley region have been completed. Field studies, magnetic polarity determinations, and previously published K-Ar age determinations indicate the region is the site of bimodal volcanism, the first recognized bimodal association within the Neogene volcanic belt of the southern Great Basin. The apparatus for the hydrothermal soak tests has been completed. The first rack of pressure vessels has been assembled and is undergoing leak testing. Tensile strength, compressive strength, and density/porosity tests have been completed for tuff samples. (ERA citation 06:008329)

LA-8550-OBES PC **A06**/MF **A01**
Los Alamos Scientific Lab., NM.
Continental Scientific Drilling Program Thermal Regimes: Comparative Site Assessment Geology of Five Magma-Hydrothermal Systems.
F. Goff, and A. C. Waters. Oct 80, 105p
Contract W-7405-ENG-36

The geology and salient aspects of geophysics and hydrogeochemistry of five high-grade geothermal systems in the USA are reviewed. On the basis of this information, a target location is suggested for a deep (5- to 8-km) borehole that will maximize the amount of scientific information to be learned at each of the five geothermal areas. (ERA citation 06:007612)

LA-8566-MS PC **A04**/MF **A01**
Los Alamos Scientific Lab., NM.
9519 Biotite Granodiorite Reacted in a Temperature Gradient.
R. W. Charles, and G. K. Bayhurst. Oct 80, 56p
Contract W-7405-ENG-36

A biotite granodiorite from the Fenton Hill Hot Dry Rock (HDR) geothermal system was reacted in a controlled temperature gradient with initially distilled water for 60d. Polished rock prisms were located in the gradient at 72, 119, 161, 209, 270, and 310 exp 0 C. Scanning electron microscope and microprobe analyses show the appearance of secondary phases: Ca-montmorillonite at 72 exp 0 C and 119 exp 0 C; zeolite, either stilbite or heulandite, at 161 exp 0 C; and another zeolite, thomsonite, at higher temperatures. Solution analyses show a steady state equilibrium exists between solution and overgrowths after about 2 weeks of reaction. The chemographic relations for the system are explored in some detail indicating the divariant assemblages may be placed in a reasonable sequence in intensive variable space. These relations predict high and low temperature effects not directly observed experimentally as well as relevant univariant equilibria. Solution chemistry indicates the Na-Ca-K geothermometer more adequately predicts temperature in this system than does the silica geothermometer. (ERA citation 06:007645)

LBL-11187 PC **A06**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Evaluation of the Susanville California Geothermal Resource.
S. Benson, C. Goranson, J. Noble, R. Schroeder, and D. Corrigan. Jun 80, 105p
Contract W-7405-ENG-48

Twelve exploratory temperature gradient holes have been drilled (bringing the total number of old and new holes and wells to 23), subsurface geologic and geophysical data have been analyzed, and a well test has been conducted. Interpretation of data obtained from well testing, drillers' and lithologic logs and geophysical surveys suggests the presence of a fault-related reservoir of high permeability, shallow depth, limited thickness and limited

lateral extent. Temperature contours and profiles suggest the upwelling of fluids on a northwest-trending fault, from where they are dispersed into the reservoir along a highly permeable, fractured agglomerate-basalt interface and fractured volcanic units. Well tests show a high lateral permeability associated with the fractured interface, and porosity values are low, supporting evidence for a fracture-dominated producing aquifer(s). The areal confinement of the anomaly has been established on three sides (west, south, east) to a depth of 200 m. In the southern portion, temperature reversals below an aglomerate-basaltic interface suggest a vertically confined aquifer. Water samples and petrologic data indicate that in the past, fluids of temperatures between 70 exp 0 C and 150 exp 0 C flowed through the fracture system. Computer modeling indicates that a horizontal, regional flow of hot fluids is required to match the observed temprature distribution. (ERA citation 06:007629)

N81-16642/3 PC **A13**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Earth and Planetary Sciences.
Time Dependent Deformation and Stress in the Lithosphere.
Ph.D. Thesis.
M. Yang. Dec 80, 291p NASA-CR-163869
Contract NAG5-41

Efficient computer programs incorporating frontal solution and time stepping procedure were developed for the modelling of geodynamic problems. This scheme allows for investigating the quasi static phenomena including the effects of the rheological structure of a tectonically active region. From three dimensional models of strike slip earthquakes, it was found that lateral variation of viscosity affects the characteristics of surface deformations. The vertical deformation is especially informative about the viscosity structure in a strike slip fault zone. A three dimensional viscoelastic model of a thrust earthquake indicated that the transient disturbance on plate velocity due to a great plate boundary earthquake is significant at intermediate distances, but becomes barely measurable 1000 km away from the source.

N81-16645/6 PC **A02**/MF **A01**
Systems and Applied Sciences Corp., Riverdale, MD.
Gravitational Field Models for Study of Earth Mantle Dynamics.
Final Report.
10 Aug 79, 12p NASA-CR-160083, NO-R-SAP-8-79-01
Contract NAS5-25141

The tectonic forces or stresses due to the small scale mantle flow under the South American plate are detected and determined by utilizing the harmonics of the geopotential field model. The high degree harmonics are assumed to describe the small scale mantle convection patterns. The input data used in the derivation of this model is made up of 840,000 optical, electronic, and laser observations and 1,656 5 deg x 5 deg mean free air anomalies. Although there remain some statistically questionable aspects of the high degree harmonics, it seems appropriate now to explore their implications for the tectonic forces or stress field under the crust.

PB81-139974
(Order as PB81-139859, PC **A05**/MF **A01**)
Geological Scientific Inst. of Shengli Oilfield (China).
Discovery of the Lower Tertiary Reef Limestone in the Northern Part of East China and its Significance in Petroleum Geology,
Qian Kai, Wang Sumin, Lin Shufan, and Shi Huaxing. 18 Mar 79, 5p
Included in Scientia Sinica, v25 n12 p1025-1029 Dec 80.

No abstract available.

PB81-139982
(Order as PB81-139859, PC **A05**/MF **A01**)
State Seismological Bureau, Beijing (China). Inst. of Geophysics.
An Investigation of the Stress Field in the Earth's Crust,
Zhang Zhili, and Liu Xinmei. 5 Mar 80, 7p
Included in Scientia Sinica, v25 n12 p1030-1036 Dec 80.

The dynamic problems of crustal orogenic movements is a significant subject in geosciences and earthquake prediction. There is a fundamental stress field of the rotating earth under the action of gravitational force and centrifugal force of rotation. Based on a suggested physical model, the authors try to analyze one of the fundamental stress fields in the crust.

PB81-159279
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Lanzhou (China). Lanzhou Inst. of Geology.
Formation and Migration of Continental Oil and Gas in China (I), A Fundamental Geological Condition for the Formation of Continental Oil and Gas,
Fan Pu, Luo Binjie, Huang Ruchang, Shen Ping, and Hui Rongyao. 28 Jul 79, 10p
Included in Scientia Sinica, v23 n10 p1286-1295 Oct 80.

This article summarizes a wealth of geological and geochemical data concerning oil fields in China. From a study of palaco-climate, salt content, sedimentary hydrodvnamics, geotectonics and other respects, it is believed that the 'continental moist depression' is the basic requirement for the formation of continental oil and gas. It is also pointed out that a humid and semi-humid climate, long steady sinking of the earth's crust, fresh-brackish water medium and hydrodynamically still environment in the centre of lake circulating flows are more favorable for the formation of oil and gas. According to the formation and development of the Mesozoic and Cenozoic moist depressions, the authors have come to the general rule of the distribution of continental oil-gas field in China.

UCID-18863 PC **A02**/MF **A01**
Lawrence Livermore National Lab., CA.
Synopses of R and D in Geothermal-Geochemical Engineering at the Lawrence Livermore National Laboratory 1976-1980.
J. E. Harrar. Dec 80, 23p
Contract W-7405-ENG-48

Research is summarized on the following: geothermal field test apparatus; brine acidification as a means of scale control at the Salton Sea Geothermal Field; tests of seeding and other chemical methods for the control of scale at the Salton Sea Geothermal Field; tests of proprietary organic additives for the control of scale at the Salton Sea Geothermal Field; tests of generic organic compounds for control of scale at Salton Sea Geothermal Field; studies of the dissolution of geothermal scale; chemical measurement developments; chemical modeling of geothermal systems; processing of geothermal brine effluents for injection; hydrogen sulfide abatement using geothermal brine effluents; use of surface waters to supplement injection at the Salton Sea Geothermal Field; and measurement of injectability of geothermal brines. (ERA citation 06:007630)

UCRL-52984 PC **A04**/MF **A01**
Lawrence Livermore National Lab., CA.
Resolution and Error of the Back Projection Technique Algorithm for Geophysical Tomography.
N. R. Burkhard. Sep 80, 63p
Contract W-7405-ENG-48

The resolution and error properties of the Back Projection Technique (BPT) for geophysical tomography are examined. It is demonstrated that: (a) the BPT algorithm always converges in the vector space corresponding to the non-zero eigenvectors; (b) the mean error in the solution after convergence is the projection of the difference between the mean values of the starting model and the real solution in the vector space corresponding to the zero eigenvectors; and (c) the covariance of the mean error is always finite. The resolving properties and error propagation characteristics of BPT for various tomographic views are discussed. In general, the resolving power and error propagation characteristics of BPT are improved with tomographic views which encircle the region under investigation. Finally, exploration strategy for geotomograhy with the BPT algorithm is discussed. The trade-off between the resolving area and parameter contrast, cell size, and data accuracy is examined. (ERA citation 06:008325)

8H. Hydrology and Limnology

ORNL/MIT-312 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Macropore-Mesopore Model of Water Flow Through Aggregated Porous Media.
L. Fong, and H. R. Appelbaum. Dec 80, 60p
Contract W-7405-ENG-26

A combined, one-dimensional, macropore-mesopore, hydrologic model was developed for simulating water flow through soils for analysis of data related to water and chemical flow in soils. Flows within the macroporous system as well as interactive flows between macroporous and mesoporous systems were modeled. Computer subroutines were written and incorporated into the existing one-dimensional Terrestrial Ecosystem Hydrologic Model (TEHM) developed at ORNL. Simulation showed that macropore flow effects are important during heavy precipitation and are more significant in soils of comparatively low hydraulic conductivity (5 to 10 cm/d). Increased drainage and decreased lateral flow result from the addition of the macropore model. The effect was more pronounced in soils of large macroporosity. Preliminary results indicate that the model is insensitive to geometrical properties of macropores. (ERA citation 06:006660)

PB81-151078 CP **T05**
National Weather Service, Silver Spring, MD. Hydrologic Research Lab.
DAMBRK Model Ver. A (National Weather Service).
Model-Simulation,
D. L. Fread, and Janice M. Lewis. 10 Sep 80, mag tape NOAA/DF-81/002
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB81-151086.

The National Weather Service DAMBRK Model develops an outflow discharge hydrograph due to head dependent flow through spillways, over the dam crest, and through a time dependent, variable geometry, dynamic breach. The breach characteristics are specified by the model user. The effects of reservoir inflows are considered along with the storage characteristics of the reservoir via a choice of either storage or dynamic wave routing within the reservoir. Capabilities for generating a wave due to landslides is also available in DAMBRK. Effects of any bridge-highway embankments on the flow of the dam-break waters through the downstream valley are directly considered.

PB81-151086 PC **A04**/MF **A01**
National Weather Service, Silver Spring, MD. Hydrologic Research Lab.
DAMBRK: The NWS Dam-Break Flood Forecasting Model,
D. L. Fread. 9 Sep 80, 56p NOAA/DF-81/002A
For system on magnetic tape, see PB81-151094, and PB81-151078.

The theoretical aspects of a mathematical model to forecast the flood hydrograph resulting from a breached dam are presented. The model (DAMBRK) is composed of two basic elements. The first simulates the outflow hydrograph due to a time-dependent, erosion-type breach of a dam using a hydraulic weir representation of the outflow through the breach. The second element routes the generated outflow hydrograph through the downstream valley via an implicit finite difference solution of the complete one-dimensional equations of unsteady flow. The model is applied to the

dam-break floods which resulted from the failures of the Teton Dam and the Buffalo Creek coal-waste dam.

PB81-151094 CP **T05**
National Weather Service, Silver Spring, MD. Hydrologic Research Lab.
DAMBRK Model Ver. B (National Weather Service).
Model-Simulation,
D. L. Fread, and Janice M. Lewis. 10 Sep 80, mag tape NOAA/DF-81/003
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB81-151086.

The National Weather Service DAMBRK Model develops an outflow discharge hydrograph due to head dependent flow through spillways, over the dam crest, and through a time dependent, variable geometry, dynamic breach. The effects of reservoir inflows are considered along with the storage characteristics of the reservoir via a choice of either storage or dynamic wave routing within the reservoir. Effects of any bridge-highway embankments on the flow of the dam-break waters through the downstream valley are directly considered. DAMBRK can also simulate the complex flow due to failure of an upstream dam into a valley containing one or more downstream dams/reservoirs.

PB81-155426 PC **A99**/MF **A01**
University of Central Florida, Orlando. Coll. of Engineering.
Urban Stormwater and Combined Sewer Overflow Impact on Receiving Water Bodies, Proceedings of the National Conference Held at Orlando, Florida on November 26-28, 1979,
Yousef A. Yousef, Martin P. Wanielista, Waldron M. McLellon, and James S. Taylor. Dec 80, 674p EPA-600/9-80-056
Grant EPA-R-806715

The conference provided a forum for researchers, practitioners and others to receive an update on the state-of-the-art and to learn about research findings dealing with stormwater impact. The main topical areas considered included: Combined sewer overflow costs vs. benefits; impacts on lakes, rivers and estuaries; ecological response to stormwater and methodologies for stormwater impact assessment; and stormwater management through the use of receiving water quality models for planning and abatement methodology.

PB81-156796 PC **A07**/MF **A01**
Maryland Univ., College Park. Dept. of Civil Engineering.
Implementation of Hydrology and Hydraulic Policy Manual and Operational Procedures.
Interim rept. May 78-Dec 79,
Richard H. McCuen. Dec 79, 137p FHWA/MD-80/08
Sponsored in part by Maryland State Highway Administration, Brooklandville.Portions of this document are not fully legible.

The goal of this study was to examine the current design policies in hydrology and implement improved design methods that better represent the current state-of-the-art. The objectives of the study were: (1) to develop a user's manual that will enable State Highway Administration design engineers with the background to understand and solve problems that are outlined in the policy statement of the Department of Natural Resources; (2) to provide classroom instruction on the use of the user's manual to solve hydrologic analyses; and (3) to research various other problem areas, such as stormwater management, that arise in implementing hydrologic policy.

PB81-158735 PC **A16**/MF **A01**
Geological Survey, Boston, MA. Water Resources Div.
Water Resources Data for Massachusetts and Rhode Island, Water Year 1979.
Water-data rept. (Annual) 1 Oct 78-30 Sep 79. Sep 80, 361p USGS/WRD/HD-80/006

Water-resources data for the 1979 water year for Massachusetts and Rhode Island consist of records of stage, discharge, and water quality of streams; contents of lakes and reservoirs; and ground-water levels. This report contains discharge records for 102 gaging stations, month end contents for 30 lakes and reservoirs, water quality for 26 gaging stations, and water levels for 108 observation wells. Also included are data for 19 low-flow and 20 crest-stage partial-record stations.

PB81-164329 PC **A04**/MF **A01**
Environmental Protection Agency, Washington, DC. Office of Drinking Water.
Proposed Ground Water Protection Strategy.
Nov 80, 66p EPA/ODW-3
See also report dated Jun 80, PB81-122624.

Public hearings on the Environmental Protection Agency's Ground Water Protection Strategy were held in five U.S. cities during January, 1981. This document outlines the proposed strategy with a discussion of the assumptions, goal and objectives of the strategy, management approaches, and technical requirements. An introductory section provides background material on ground water and involvement of states, industry, public interest groups and others.

PB81-803793 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Sediment Water Interaction and Its Effect Upon Water Quality. 1964-1978 (Citations from the NTIS Data Base).
Rept. for 1964-78.
Feb 81, 200p

This bibliography contains citations on the release and absorption of chemicals by sediments, as it relates to water quality. Topics include nutrient recycling, absorption and desorption of heavy metals and pesticides, ion exchanging, effects upon biological processes, the chemistry involved, and methods of stopping desorption. Salt water studies have been excluded. (This updated bibliography contains 192 citations, none of which are new entries to the previous edition.)

PB81-803801 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Sediment Water Interaction and Its Effect Upon Water Quality. 1979-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1979-Feb 81.
Feb 81, 141p
Supersedes PB80-803984, and NTIS/PS-79/0016.

The cited research covers the release and absorption of chemicals by sediments, as it relates to water quality. Topics include nutrient recycling, absorption and desorption of heavy metals and pesticides, ion exchanging, effects upon biological processes, the chemistry involved, and methods of stopping desorption. Salt water studies have been excluded. (This updated bibliography contains 132 citations, 91 of which are new entries to the previous edition.)

81. Mining Engineering

AD-A094 651/7 PC **A11**/MF **A01**
National Research Council, Washington, DC. Committee on Offshore Energy Technology.
Environmental Exposure and Design Criteria for Offshore Oil and Gas Structures.
May 80, 231p
Contract N00014-76-C-0309

One of the tasks of the Committee on Offshore Energy Technology was to review the availability of engineering field data, methods, and procedures for adequately describing and interpreting the environmental conditions that go into criteria for the design, verification, and inspection of offshore oil and gas structures. Accordingly, the committee examined how industry obtains environmental data, how it uses the data to evaluate environmental exposures, and how it uses environmental exposures to establish criteria to design, build, install, and operate offshore platforms. The committee examined all three phases of developing offshore petroleum reserves: pre-lease, exploration, and production. The purpose was to find where and what types of data were needed by government and industry. This report represents the work and findings of the committee. Section I presents the committee's recommendations and conclusions and the technical analysis upon which these are based. Section II consists of background papers that lay out in greater detail the concepts and technical analysis developed in this report.

ANL/LRP-8 PC **A05**/MF **A01**
Argonne National Lab., IL.
Land Reclamation Program Annual Report, 1979.
Sep 80, 91p
Contract W-31-109-ENG-38

The Argonne Land Reclamation Program, sponsored by the United States Department of Energy's Assistant Secretary for Environment, is a joint effort of two Argonne divisions: Energy and Environmental Systems and Environmental Impact Studies. The program is carried out by a multidisciplinary team of scientists and engineers and has three primary objectives: (1) to develop energy-efficient and cost-effective mining and reclamation techniques; (2) to assist industry in evaluating the viability of environmental regulations and demonstrating techniques to meet these regulations; and (3) to supply data and evaluation techniques to decisionmakers concerned with trade-offs between energy development and environmental quality. Six integrated field research sites have been established to address problems associated with surface mining operations. This program relies heavily on input from industry and has developed working arrangements with coal companies at each of the current mining sites. A major area of interest is the development of a ten-year environmental mining and reclamation research plan for the Assistant Secretary for Environment. The Land Reclamation Program assigns the highest priority to the transfer to users of information generated by its research. (ERA citation 06:006891)

DOE/BC/10175-4 PC **A02**/MF **A01**
Russell (Larry) and Associates, Inc., Houston, TX.
Study to Determine Feasibility of Developing a Mechanically-Operated, Surface-Controlled Deviation Device for Directional Drilling. Monthly Report, November 1980.
L. R. Russell, and A. W. Crull. Nov 80, 4p
Contract AC19-80BC10175

No abstract available.

DOE/BC/10311-1 PC **A02**/MF **A01**
Computer/Bioengineering Inst., El Paso, TX.
CO Sub 2 Stimulation Process. Final Technical Report, August 28, 1980-November 30, 1980.
J. T. Patton. 1980, 25p
Contract AC19-80BC10311

Cyclic CO sub 2 stimulation of a production well, especially in viscous oil reservoirs, is developing as a method of rapidly producing tertiary oil and obtaining valuable data. History matching provides confirmation of CO sub 2 - crude interactions, measured in the laboratory, that can increase the accuracy of CO sub 2 flood predications. Profitability of the process is enhanced by proper control of key operating parameters. The most important are: CO sub 2 injected per cycle, number of cycles, and back pressure during production. Reservoir parameters dictate the selection of commercial applications. The dominant factors are: viscosity of the oil, oil swelling the viscosity reduction due to CO sub 2 dissolving in the crude, trapped gas saturations, fluid saturation, permeability, and wettability. In the absence of published field data, this study utilized a numerical simulator to predict incremental oil recovery as a function of the above operating and reservoir parameters. Multiple regression analysis was then used to relate the efficacy (STB incremental oil/MCF CO sub 2 injected) of the CO sub 2 cyclic stimulation process to six parameters. Under ideal conditions one extra barrel of stock tank oil is produced for each MCF of CO sub 2 injected. Efficacy decreases with both number of cycles and volume injected. (ERA citation 06:006921)

DOE/EML-385 PC **A03**/MF **A01**
Department of Energy, New York. Environmental Measurements Lab.
Review of exp 222 RN in Natural Gas Produced from Unconventional Sources.
C. V. Gogolak. Nov 80, 38p

A review of the literature on trace radioactivity in natural gas and natural gas products has been performed and the consequent radioactivity concentrations and dose rates due to natural radioactive elements in natural gas produced from Devonian shale wells, western tight gas sands, geo-pressurized aquifiers and coal beds have been studied. Preliminary data on exp 222 Rn concentrations from these energy sources fall within the range observed for more conventional sources. Gas produced from reservoirs with higher than average natural exp 238 U higher than average levels of exp 222 Rn. Massive fracturing techniques do not appear to raise the relative concentration of radon in natural gas. (ERA citation 06:006953)

DOE/ER/10466-T1 PC **A02**/MF **A01**
Energy and Minerals Research Co., Exton, PA.
Efficient Ultrasonic Grinding: A New Technology for Micron-Sized Coal. Quarterly Technical Progress Report No. 4, June 16, 1980-September 15, 1980.
W. B. Tarpley, Jr., P. L. Howard, and G. R. Moulder. 1 Oct 80, 19p
Contract AC02-79ER10466

Experimental work was conducted in the following areas: (1) moist grinding with and without ultrasonics; (2) tests of pyrite selective liberation; and (3) fabrication and assembly of the dual-roller apparatus. Using a water spray as a moistening agent, grinding was performed with the cylinder-segment apparatus. A 13:1 increase in -7 micron fines resulted. A more accurate iron determination method (ASTM D2492-68) was applied to two samples of well-characterized coals, enabling an expansion of the data on the degree of preferential liberation of inclusions attributable to ultrasonic comminution. A 5:1 reduction in pyritic iron occurred with ultrasonic grinding of the two coals tested. The dual-roll apparatus was completely assembled and aligned. Preliminary grinding was begun to determine basic parameters and to check out the equipment. (ERA citation 06:006903)

DOE/ET/12040-2 PC **A05**/MF **A01**
Kentucky Univ., Lexington. Dept. of Geology.
Depositional Model for the Devonian-Mississippian Black-Shale Sequence of North America: A Tectono-Climatic Approach.
F. R. Ettensohn, and L. S. Barron. Jan 81, 83p
Contract AC21-76ET12040

The model, which has been developed, emphasizes regional tectonic, climatic, and sedimentary patterns rather than the specifics of black-shale deposition. The specific conditions under which black shales accumulate are already fairly well known. What is not so well known, however, are the regional controls which permitted these conditions to form and operate. It is these regional controls that are emphasized in this model. The Devonian-Mississippian black-shale sequence of North America is a distinctive stratigraphic interval that reflects a low rate of clastic-sediment influx, high organic productivity, and development of anaerobic conditions in a stratified water column within an inland, equatorial, epicontinental sea. The origin of these conditions apparently is related to the interaction of tectonism and climatic conditions unique to North America at this time. The Black-Shale Sea and its organic-rich muds were essentially the result of subsidence and sediment-starved conditions created by the collisional event which formed the Acadian Mountains. The interaction of these mountains with the atmospheric circulation patterns of the time is an important aspect of black-shale deposition. (ERA citation 06:006948)

DOE/ET/14256-1 PC **A03**/MF **A01**
Foster-Miller Associates, Inc., Waltham, MA.
Design, Fabrication and Testing of a Low Headroom Conveyor Transfer Chute. Final Technical Report.
S. B. Douglas, and P. Larson. Dec 80, 28p
Contract AC01-79ET14256

The increased usage of belt conveyors has provided higher levels of productivity than otherwise obtainable. It is generally recognized that most problems with belt conveyors occur at the loading and transfer points; it follows naturally, then, that for a high production operation, all belt conveyor transfer points must be designed, installed, and maintained with utmost care. The US Department of Energy has determined that there is a need for a low headroom conveyor transfer chute. The use of such a chute would provide several benefits, noted below: the amount of roof required to be taken to provide sufficient vertical space for the transfer point is minimized; less maintenance is required at the transfer. A good chute design produces less spillage, requires less adjustment, and operates satisfactorily under a wide range of material types and loading conditions; performance is improved. Loads are centered, keeping the belts trained, and dust and noise generation is minimized, enhancing the work environment; lower costs are incurred by the operator. The proper chute will wear out less frequently, will not damage the belt due to excessive impact of detraining tendencies, and will require less continual spillage maintenance. This report describes the conceptual design efforts of Foster-Miller Associates, Inc. to develop a low headroom conveyor transfer chute. (ERA citation 06:006896)

DOE/ET/28486-T1 PC **A09**/MF **A01**
Pennsylvania Univ., Philadelphia. Energy Center.
Geothermal Investment Analysis with Site-Specific Applications to Roosevelt Hot Springs and Cove Fort-Sulphurdale, Utah.
T. A. V. Cassel, R. H. Edelstein, and P. D. Blair. Dec 78, 194p
Contract AS02-78ET28486

The analysis and modeling of investment behavior in the development of hydrothermal electric power facilities are reported. This investment behavior reflects a degree of sensitivity to public policy alternatives concerning taxation and regulation of the resource and its related energy conversion facilities. The objective of the current research is to provide a realistic and theoretically sound means for estimating the impacts of such public policy alternatives. A stochastic simulation model was developed which offers an efficient means for site-specific investment analysis of private sector firms and investors. The results of the first year of work are discussed including the identification, analysis, quantification and modeling of: a decision tree reflecting the sequence of procedures, timing and stochastic elements of hydrothermal resource development projects; investment requirements, expenses and revenues incurred in the exploration, development and utilization of hydrothermal resources for electric power generation; and multiattribute investment decision criteria of the several types of firms in the geothermal industry. An application of the investment model to specific resource sites in the state of Utah is also described. Site specific data for the Known Geothermal Resource Areas of Roosevelt Hot Springs and Cove Fort-Sulphurdale are given together with hypothesized generation capacity growth rates. (ERA citation 06:007632)

DOE/ID/12079-17 PC **A07**/MF **A01**
Utah Univ. Research Inst., Salt Lake City.
WELLOG: Computer Software System for Analyzing and Plotting Well LOG Data (A User's Guide to WELLOG.REV2).
J. W. Atwood, T. J. Killpack, W. E. Glenn, and C. Nutter. Nov 80, 144p ESL-45
Contract AC07-79ID12079

WELLOG is a software system that has been developed to plot digitized well log data in a manner suitable for analysis. Multiple logs can be plotted side by side for correlation analysis, and up to three logs can be plotted on a cross plot. Data entry, editing, and modification functions are also provided by the program. Digitizing is accomplished by a TEKTRONIX 4954 (on-line) digitizing tablet, and plotting is done on a TEKTRONIX 4014 graphics terminal, a STATOS 42 electrostatic plotter, or a CALCOMP pen plotter using a device independent plotting system. This program (WELLOG.REV2) is not as system-dependent as the former version (WELLOG.REV1). The user must supply a program to digitize the data and supply subroutines to interface the program with file manipulation and plotting routines of their system. One major improvement is the use of an on-line digitizing system whereby the program accesses disk files rather than reading the data from tape. In REV2 the merge file has been automated such that the file is initialized automatically upon creation and also delete protected. The randomly spaced data capabilities have been greatly improved allowing the averaging and cross plotting of the data. Routines have been added which allow all of the cross plots excepting the Z-plot to be printed on a line printer. Dresser Atlas' A-K plot has also been added. The program is almost completely self-contained needing only a few interfacing and system subroutines. (ERA citation 06:007621)

DOE/MC/08333-2 PC **A07**/MF **A01**
Science Applications, Inc., Morgantown, WV.
State-of-the-ART Review of Nitrogen and Flue Gas Flooding in Enhanced Oil Recovery. Final Report.
H. R. Anada. Dec 80, 131p
Contract AM21-78MC08333

This report provides a review of technical publications and patents in the field of nitrogen and flue gas flooding in Enhanced Oil Recovery (EOR). The physical and chemical characteristics of nitrogen and flue gas are provided with some comparisons with CO sub 2 related to EOR operations. Experimental research and field based activities using nitrogen and flue gas are briefly summarized. Cost data for generation of nitrogen and flue gases are provided. Nitrogen and flue gas costs are approximately one third to one half that of CO sub 2 . The low cost of production and its non-corrosive nature are advantages of using nitrogen, whereas the higher miscibility pressure requirement is a disadvantage. Nitrogen flooding does not work well with low API gravity crudes. Miscible displacement with nitrogen seems promising for oils containing solution gas. Flue gas flooding can be applied to low API gravity crude reservoirs. However, flue gas flooding creates operating problems due to its corrosive nature. The report provides a discussion on process and reservoir parameters that affect nitrogen and/or flue gas flooding in EOR. A bibliography of related literature is provided in the appendices. (ERA citation 06:006922)

DOE/MC/11687-T1 PC **A07**/MF **A01**
Environmental Research Inst. of Michigan, Ann Arbor. Applications Div.
Geologic Remote Sensing of the Moorman Syncline, Kentucky, Region. Final Report, August 1, 1979-November 30, 1980.
P. L. Jackson. Nov 80, 147p
Contract AC21-79MC11687

Remote sensing imagery of a region in western Kentucky extending into Indiana, Illinois, and Tennessee was geologically interpreted for eastern shale gas exploration. The region is one Landsat frame enclosing the Moorman syncline, including the Wabash, Rough Creek and Pennyrile fault systems, and many oil and gas fields. Geologists with regional experience found unmapped lineaments in the imagery which were similar to those corresponding to the mapped faults. On the basis of some of these lineaments and other favorable geology, two sites for further exploration were selected. The interpreters concluded that the imagery, partiularly the Landsat MSS, showed potential for use in shale gas exploration. (ERA citation 06:006949)

DOE/METC/5232-4 PC **A04**/MF **A01**
Shell Oil Co., Houston, TX.
Weeks Island "S" Sand Reservoir B Gravity Stable Miscible CO sub 2 Displacement Iberia Parish, Louisiana.
G. E. Perry, and R. J. Watts. Nov 80, 56p
Contract AC05-77ET12004

Shell, in conjunction with the Department of Energy, is conducting a gravity stable displacement field test of the miscible CO sub 2 process. The test is being conducted in a 12,800-foot deep Gulf Coast reservoir. Injection of the CO sub 2 slug at the producing gas-oil contact commenced in October 1978. The slug of CO sub 2 is being moved downward by production of downdip water. Injection of the 50,000-ton slug was completed in February of 1980, and production is projected to

start in the third quarter of 1980. Conventional cores and the log-inject-log technique were used to determine residual oil saturation in a well drilled as the pilot producer. The new well is being used to monitor the downdip displacement. Pulsed neutron logging devices have been used to monitor the downdip displacement. Pulsed neutron logging devices have been used to monitor the CO sub 2 movement in the vicinity of the observation well. The logs have been successful in detecting the CO sub 2 slug and its subsequent movement. Production tests of the log-inject-log perforations, located in a previously watered-out portion of the sand, 48 feet below the point of CO sub 2 injection in the offset well, have indicated an oil column has passed the observation perforations. Further tests and logs indicated CO sub 2 had reached the observation perforations in November 1979. These perforations were then squeezed off and new production perforations were placed at the final completion depth 130 feet below the level of CO sub 2 injection. (ERA citation 06:006923)

DOE/SF/11452-1 PC **A06**/MF **A01**
GeoTrans, Inc., Reston, VA.
Geothermal Reservoir Engineering Computer Code Comparison and Validation.
C. R. Faust, J. W. Mercer, and W. J. Miller. 12 Nov 80, 120p
Contract AC03-80SF11452
Portions of document are illegible.

The results of computer simulations for a set of six problems typical of geothermal reservoir engineering applications are presented. These results are compared to those obtained by others using similar geothermal reservoir simulators on the same problem set. The purpose of this code comparison is to check the performance of participating codes on a set of typical reservoir problems. The results provide a measure of the validity and appropriateness of the simulators in terms of major assumptions, governing equations, numerical accuracy, and computational procedures. A description is given of the general reservoir simulator - its major assumptions, mathematical formulation, and numerical techniques. Following the description of the model is the presentation of the results for the six problems. Included with the results for each problem is a discussion of the results; problem descriptions and result tabulations are included in appendixes. Each of the six problems specified in the contract was successfully simulated. (ERA citation 06:007611)

FE-8924-1 PC **A08**/MF **A01**
Goodman Equipment Corp., Chicago, IL.
Monorail Bridge Conveyor. Phase I Report, March 31, 1980.
W. Silks. Mar 80, 169p
Contract ET-78-C-01-8924

This report covers the first phase of a four-phase contract to develop and test a roof hung monorail bridge conveyor coal haulage system working behind a continuous miner. Phase I covers the final design. The original concept presented had to be analyzed before final design could proceed. The analysis revealed that 24 ft long bridge conveyor segments were the optimum length, the suspension system must have the vertical hinge point between bridges, the impact point of the coal transfer point and the suspension point itself, coincidental. The propulsion system must be such that each bridge is self propelled in order to minimize side loading on the monorail. The conveyor belt drive could be simplified since it only had to drive one single 24 ft conveyor. The design and detail drawings including MSHA approved enclosures were completed and are ready to be released for Phase II, Fabrication. (ERA citation 05:021717)

FE-9090-1 PC **A13**/MF **A01**
Ingersoll-Rand Research, Inc., Princeton, NJ.
Flexible Roof Drill for Low Coal. Final Technical Report.
J. L. Finney, R. N. Eakin, D. E. Rich, and T. J. Wall. Jul 79, 298p
Contract AC01-74ET12196

The IRRI Flexible Roof Drill for low coal, referred to as the Rod Changer Drill, evolved as a result of the Phase I and II efforts on this contract in which several design concepts were evaluated. The Low Coal Drill program was initiated to provide a roof drill which, in conjunction with the Bendix Roof Bolt Inserter, would be capable of operating in coal seams as low as 30 inches. This drill would have the ability to drill and install bolts of up to eight feet in length, thus retaining productivity and increasing operator safety by removing the operator from the immediate area. The IRRI Rod Changer Drill performs the drilling of longer than seam height roof drills by automatically coupling up to 6 short drill steel sections to form the drill string. This concept will permit the operator to perform drilling from a remote location, although bolt insertion requires his presence in the immediate area. The underground test evaluation was conducted at Bethlehem Nicholas Mine No. 81 located in Drennen, West Virginia. The field trial was completed in two and one-half months in which the vehicle performed adequately in all areas. The test demonstrated the ability of the Rod Changer Drill to successfully function in an underground environment without major malfunctions. The test also revealed the necessity of further refinement of the drill to improve productivity and reliability. (ERA citation 06:006897)

GJBX-239(80) PC **E09**/MF**$4.30**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial Gama Ray and Magnetic Survey: Lawrence Quadrangle of Kansas and Missouri. Final Report.
Nov 80, 251p
Contract AC13-76GJ01664
Includes 8 sheets of 48 reduction microfiche.

The Lawrence quadrangle covers approximately 7500 square miles in Kansas and Missouri over the western edge of the Ozark Uplift. Sediments in this area are mostly Pennsylvanian and Permian sandstone, shale, limestone, and coal. As mapped, these are the dominant units in the quadrangle. A search of available literature revealed no known uranium deposits. A total of 94 uranium anomalies were detected and are discussed briefly. Most appear to be related to cultural features. Those associated with coal mine tailings appear to be most significant. Magnetic data appears to relate to complexities in the Precambrian basement. (ERA citation 06:006985)

GJBX-259(80) PC **E09**/MF**$4.30**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial gamma Ray and Magnetic Survey: Kansas City Quadrangle of Kansas and Missouri. Final Report.
Nov 80, 253p
Contract AC13-76GJ01664
Includes 8 sheets of 48 reduction microfiche.

The Kansas City quadrangle covers approximately 7400 square miles in northwestern Missouri and northeastern Kansas. It overlies the southeastern edge of the Forest City Basin, which contains predominantly Paleozoic sediments. Permian and Pennsylvanian formations cover much of the surface, but Quaternary sedimentation dominates certain regions of the quadrangle. A search of available literature revealed no known uranium deposits. A total of 102 uranium anomalies were detected and are discussed briefly. None were considered significant and all appear to be related to cultural features. Magnetic data appears to correlate directly with underlying Precambrian material. (ERA citation 06:006938)

GJBX-260(80) PC **E09**/MF**$4.30**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial gamma Ray and Magnetic Survey, Jefferson City Quadrangle, Missouri. Final Report.
Nov 80, 261p
Contract AC13-76GJ01664
Includes 8 sheets of 48 reduction microfiche.

The Jefferson City quadrangle covers approximately 7500 square miles at the Northwestern end of the Ozark uplift. Lithified material exposed, ranges in age from Cambrian through Pennsylvanian, but Pennsylvanian sediments dominate the surface as mapped. Some alluvium is mapped in river flood plain areas. A search of available literature revealed no known uranium deposits. A total of 95 uranium anomalies were detected and are discussed briefly in this report. All anomalies are related to cultural features, but those associated with coal mine tailings appear to have some significance. Magnetic data appear to relate to complexities in the underlying Precambrian rocks. (ERA citation 06:006989)

GJBX-261(80) PC **E09**/MF**$4.30**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial gamma Ray and Magnetic Survey: Nebraska City Quadrangle, Missouri, Iowa, Nebraska, and Kansas. Final Report.
Nov 80, 249p
Contract AC13-76GJ01664
Includes 8 sheets of 48 reduction microfiche.

The Nebraska City quadrangle covers approximately 7250 square miles primarily in Missouri, Iowa, and Nebraska. It overlies the deepest sections of the Forest City Basin. Permian and Pennsylvanian sediments cover most of the surface as mapped. A search of available literature revealed no known uranium deposits. A total of 114 uranium anomalies were detected and are discussed briefly. None were considered significant and all appear to be related to cultural features. Magnetic data appears to be largely in agreement with existing structural interpretations of the area. (ERA citation 06:006990)

GJQ-005(80) PC **E04**/MF **A01**
New Mexico Bureau of Mines and Mineral Resources, Socorro.
National Uranium Resource Evaluation. Raton Quadrangle New Mexico and Colorado. Final Report.
B. E. Reid, G. B. Griswold, L. C. Jacobsen, and R. H. Lessard. Dec 80, 96p
Contract AC13-76GJ01664
Includes 6 sheets of 24 reduction microfiche.

Using National Uranium Resource Evaluation criteria, the Raton Quadrangle (New Mexico and Colorado) contains one environment favorable for uranium deposits, the permeable arkosic sandstone members of the Pennsylvanian-Permian Sangre de Cristo Formation for either peneconcordant or roll-type deposits. The favorable parts of the Sangre de Cristo lie mostly in the subsurface in the Raton and Las Vegas Basins in the eastern part of the quadrangle. An area in the Costilla Peak Massif was investigated for uranium by determining geochemical anomalies in stream sediments and spring waters. Further work will be required to determine plutonic environment type. Environments unfavorable for uranium deposits include the Ogallala, Raton, and Vermejo Formations, the Trinidad Sandstone, the Pierre Shale, the Colorado Group, the Dakota Sandstone, the Morrison Formation, the Entrada and Glorieta Sandstones, Mississippian and Pennsylvanian rocks, quartz-pebble conglomerates, pegmatities, and Tertiary granitic stocks. (ERA citation 06:006991)

LA-8004-MS PC **A10**/MF **A01**
Los Alamos Scientific Lab., NM.
Uranium Hydrogeochemical and Stream Sediment Reconnaissance of the Newcastle NTMS Quadrangle, Wyoming, Including Concentrations of Forty-Two Additional Elements.
S. J. Goff, W. F. Sandoval, D. L. Gallimore, C. L. Talcott, and R. G. Martinez. Jun 80, 212p
Contract W-7405-ENG-36

Water and sediment samples were collected and each water sample was analyzed for U, and each sediment sample was analyzed for 43 elements, including U and Th. Uranium concentrations in water samples range from below the detection limit of 0.02 ppB to 702.26 ppB and have a median of 1.73 ppB and a mean of 11.76 ppB. Water samples containing high uranium concentrations generally are associated with known uranium mining activity or units known to be uranium bearing. About one-third of the water samples containing high uranium concentrations were collected from locations within the Pumpkin Buttes and Turnercrest-Ross Districts. Nearly half of the water samples containing high uranium concentrations were collected from locations just west of the Monument Hill and Highland Flats-Box Creek Districts. Similar anomalous uranium concentrations in this region have been reported updip from Exxon's Highland uranium deposits. High uranium concentrations were also found associated with the Lance Creek-Old Woman Anticline District. Uranium concentrations in sediment samples range from 1.14 to 220.70 ppM and have a median of 3.37 ppM and a mean of 4.03 ppM. Throughout the major urani-

um mining districts of the Powder River Basin, sediment samples with high uranium concentrations were collected from dry streams located near wells producing water samples with high uranium concentrations. High uranium concentrations were also found associated with the Lance Creek oil field where uranium mineralization is known in the White River formation. High uranium concentrations were also found in sediment samples in areas where uranium mineralization is not known. These samples are from dry streams in areas underlain by the White River formation, the Niobrara formation, and the Pierre, Carlisle, Belle Fourche, and Mowry shales. (ERA citation 06:006992)

LBL-11356 PC **A04**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
User Information Manual. SUBSID: A Nonlinear, Two Dimensional Finite Element Program for Static Evaluation of Mining Subsidence.
J. L. Ratigan. Jun 80, 74p
Contract W-7405-ENG-48

In modified in-situ (MIS) oil shale retorting, large chambers of rubblized oil shale are formed by mining out about 20% to 40% of the in-place shale and blasting the balance into the created void. The mined-out material is brought to the surface and oil is recovered from it by surface retorting. The in-place material is pyrolyzed to recover oil, leaving large numbers of abandoned retort chambers underground. This type of oil shale processing may result in a number of environmental problems, including in-situ leaching of the abandoned retorts, low resource recovery (large pillars are required to support the overburden), and subsidence. These problems may be mitigated by filling abandoned retorts with a grout that would fill the void space, thus improving retort structural strength and stiffness, and reducing retort permeability to groundwater flow. If sufficient strength and stiffness can be developed, it may be possible to design retorts so that the pillars can be retorted and resource recovery improved. This document describes a computer program that was developed and used to evaluate the strength and stiffness required in a grouted retort to support the overburden and to improve resource recovery. The program SUBSID was developed to predict subsidence over a field of MIS retorts under various conditions of retort backfill. Where subsidence must be prevented or limited, backfilling retorts can permit retort design with a higher extraction ratio than would otherwise be possible. SUBSID can be used to relate the desired increase in extraction ratio to the required structural properties of the retorts after backfilling, thus allowing costs and benfits to be balanced against each other. (ERA citation 06:006958)

NE/GEO-80/1 PC **A02**/MF **A01**
Lund Inst. of Tech. (Sweden).
Geothermal Energy Production in Skaane, Sweden.
L. Bjelm, H. Bruch, P. G. Persson, and J. Bennet. Mar 80, 19p LUTVDG/(TVLG-3009)/1-15/(1980) In Swedish.
U.S. Sales Only.

The conditions for geothermal energy production in Skaane have been studied for 3 years. The most favorable regions and formations have been localized. The total energy content is at least 6700 TWh, and the productivity of a bore-hole is calculated to 1 to 5 MW during 8 to 150 years. The salt content of the geothermal water in the depth of 2 km is approximately 20% in south-western Skaane and 4% in the region of Landskrona. The Cenomanian and Campanian stages of the geologic formations possess a high exploitation value in combination with the heat pump. The storage experiments which have been accomplished by mathematical models show good efficiency in sandstone formations at the depth of approximately 500 m. The storage of heat in deep-seated aquifers is favorable for urban districts. Shallow geothermal wells can be utilized for the storage of sun-heated water. The geothermal information about Skaane warrants pilot-surveys of full-size projects. (ERA citation 06:005959)

NVO-217 PC **A05**/MF **A01**
Department of Energy, Las Vegas, NV. Nevada Operations Office.
Geopressured-Geothermal Drilling and Testing Plan: Magma Gulf/Technadril-Dept. Of Energy MGT-DOE AMOCO Fee No. 1 Well, Cameron Parish, Lousiana.
Jul 80, 97p
Contract AC08-78ET27082

The following topics are covered: generalized site activities, occupational health and safety, drilling operations, production testing, environmental assessment and monitoring plan, permits, program management, reporting, and schedule. (ERA citation 06:007640)

ORNL-tr-4678 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
System Analysis of Mineral Coal Preparation as the Basis for a Mathematical Model.
W. Roesner, W. Plate, and W. Simonis. 1972, 27p
Contract W-7405-ENG-26
A, Aufbereit.-Tech. n10 P620-630 1972.

The system mineral-coal dressing is split into its elements, analyzed, systemized by the basic process, process steps and dressing method, identified and represented in a coordinate system. Basic process and process steps can be traced back to three basic functions, i.e. separation, collection, change of characteristic. The dressing methods used at present are identified by eight different logical YES-NO combinations for the steps: primary classifying, separating, desliming and sorting. The pattern developed which is generally applicable for mineral coal dressing permits their being represented and described with the aid of 51 activities (mass flows) and 41 functions. It constitutes the basis for a simulation, a mathematical description, for optimization, process controlling and, consequently, for a mathematical model. In the industry model for mining, coal preparation lies at the intersecting point of the two control systems, feed forward and feed back. It has the task, on the other hand, of producing the highest possible total value of salable products from the available raw material with the lowest possible expenditure, but, on the other hand, of satisfying the market's demands, to the greatest extent possible, with the raw coal supplied. The combination of both control systems in one operations model, coal mining, makes technical-economic optimization possible. This is also true for the sub-area coal preparation for which technical-economic optimization is only possible with the help of a mathematical model. (ERA citation 06:006907)

PB81-147282 PC **A02**/MF **A01**
Bureau of Mines, Pittsburgh, PA. Pittsburgh Research Center.
Practical Ignition Problems Related to Intrinsic Safety in Mine Equipment. Four Short-Term Studies.
Rept. of investigations/1980,
E. L. Litchfield, T. A. Kubala, T. Schellinger, F. J. Perzak, and D. Burgess. 1980, 24p BUMINES-RI-8464

Four short-term studies of practical ignition problems were undertaken and completed during the course of the Bureau of Mines project 'Development of Specifications for Intrinsically Safe Equipment.' Conclusions were as follows: (1) the most easily ignitible mixture of propane-air in a PTB break flash apparatus is approximately 5.2 percent propane; (2) miniature lamp bulbs to be used in intrinsically safe circuits are about as incendive to coal dust-air as to methane-air and should be tested in gas mixtures containing about 7.0 to 7.5 percent methane; (3) the sodium amalgam contained in high-pressure sodium lamps does not present an ignition hazard for coal dust or methane, where the lamps contain no more than 30 milligrams of amalgam; (4) the maximum allowable surface temperature of permissible electrical enclosures should remain at 150C despite efforts by industry groups to raise the value to 200C.

PB81-148306 PC **A04**/MF **A01**
Bureau of Mines, Denver, CO. Denver Research Center.
Documentation and Analysis of a Massive Rock Failure at the Bautsch Mine, Galena, IL.
Rept. of investigations/1980,
Jack Touseull, and Charles Rich, Jr. 1980, 57p BUMINES-RI-8453

On November 15, 1972, the Bautsch mine, a lead-zinc mine in Paleozoic dolomites, experienced massive rock failure involving 3 to 5 million tons. Because this failure was large and extended to the surface, it was included in the Federal Bureau of Mines investigations on 'Massive Rock Failures'. Analysis of the rock mechanics and mode of failure revealed that failure at the Bautsch mine was the result of the interrelationship of many factors. Factors related to the failure were found to be external and internal to the mining environment. Unlike internal factors, external factors were not apparent and, therefore, many external factors were investigated; some of which are not normally considered in rock mechanics analyses. External and internal factors determined to be of significant importance were: (1) precipitation, (2) fractures, (3) plastic clay layer, (4) topography, (5) rock alteration, (6) bedding, and (7) mining zone dimensions.

PB81-148389 PC **A02**/MF **A01**
Bureau of Mines, University, AL. Tuscaloosa Research Center.
Recovery of Rutile from a Porphyry Copper Tailings Sample.
Rept. of investigations/1980,
T. O. Llewellyn, and G. V. Sullivan. 1980, 24p BUMINES-RI-8462

Beneficiation studies of the tailings showed that best flotation results were obtained when sulfides and carbonates were removed by bulk flotation prior to rutile flotation. Rutile flotation was most effective when a petroleum sulfonate collector was used in an acid circuit. From this basic method of flotation, two alternative procedures were developed. The first procedure was to size and grind the tailings to minus 200 mesh; deslime the total pulp; and then float the sulfides, carbonates, and rutile. The second procedure was the same, except that it did not include sizing and grinding.

PB81-152274 PC **A99**/MF **A01**
Bureau of Mines, Washington, DC.
Minerals Yearbook 1977. Volume I. Metals and Minerals.
1980, 1075p BUMINES-MYB-1977-VOL-1
See also Volume 2, 1976, PB81-152282 and Volume 2, 1974, PB-275 049.

Contains chapters on virtually all metallic and nonmetallic mineral commodities important to the domestic economy. In addition, it includes a general review chapter on the mineral industries, a chapter on mining and quarrying trends, and a statistical summary.

PB81-152282 PC **A99**/MF **A01**
Bureau of Mines, Washington, DC.
Minerals Yearbook 1976. Volume II. Area Reports: Domestic.
1980, 848p BUMINES-MYB-1976-VOL-2
See also Volume 3, 1976, PB81-152290.

Contains chapters on the mineral industry of each of the 50 States, the U.S. inland possessions in the Pacific Ocean and the Caribbean Sea, and the Commonwealth of Puerto Rico. This volume also has a statistical summary, identical to that in Volume I.

PB81-152290 PC **A99**/MF **A01**
Bureau of Mines, Washington, DC.
Minerals Yearbook 1976. Volume III. Area Reports: International.
1980, 1402p BUMINES-MYB-1976-VOL-3
See also Volume 2, 1976, PB81-152282.

Contains the latest available mineral data on more than 130 foreign countries and discusses the importance of minerals to the economies of these nations. A separate chapter reviews the international mineral industry in general and its relationship to the world economy.

PB81-859811 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Well Drilling Fluids. January, 1970-February, 1981 (Citations from the NTIS Data Base).
Rept. for Jan 70-Feb 81.
Feb 81, 131p NERACUSGNT1640

The citations relate to studies, designs, and applications of drilling fluids. Nondamaging fluids, vibra-

tory screening of fluids, flushing fluids, polymer muds, and electric treatment of drilling fluids are discussed. (Contains 109 citations, fully indexed and including a table of contents.)

RMO-1000 PC **A05**/MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Uranium Exploration of the Colorado Plateau: Interim Staff Report.
Oct 80, 91p
Contract AC13-76GJ01664

This report is an issue of the original draft copy of the Interim Staff Report on Uranium Exploration on the Colorado Plateau, dated June 1951. The original draft copy was only recently located and is being published at this time because of the interest in the contained historical content. The table of contents of this report lists: history of uranium mining; geology; proposed program for the geologic investigations section; general activities of industry and government; and future exploration of sedimentary uranium deposits and anticipated results. Under the proposed program section are: future of the copper-uranium deposits as a source of uranium; uraniferous asphaltite deposits; and commission exploration and future possibilities. The section on general activities of industry and government includes: exploratory and development drilling; field investigations and mapping; early geologic investigations and investigations by the US geological survey; and geophysical exploration. Tables are also presented on: uranium production by districts; US Geological survey drilling statistics; Colorado Exploration Branch drilling statistics; summary of drilling projects; and comparative yearly core-drill statistics on the Colorado Plateau. (ERA citation 06:005793)

UCRL-50026-80-2 PC **A03**/MF **A01**
Lawrence Livermore National Lab., CA.
LLNL In Situ Coal Gasification Project. Quarterly Progress Report, April-June 1980.
D. U. Olness. 25 Jul 80, 28p
Contract W-7405-ENG-48

We have continued our laboratory work on forward gasification through drilled holes in blocks of coal. These tests have produced some insight into cavity growth mechanisms and particulate production in Wyodak coal. The results will be presented at the Sixth Underground Coal Conversion Symposium in July. The data from the Hanna 4B experiment have been incorporated into the UCC Data Base and have been analyzed in the same way as the Hoe Creek data. Eventually, all of the Department of Energy (DOE) test data will be included in this continuing program. Site-restoration work has been started at the Hoe Creek site. This work includes the sealing of abandoned wells, some grading and reseeding of the ground surface, and general cleanup. A search for a site for underground coal-gasification (UCG) testing and possible commercial development has been carried out in Washington. The Tono basin was chosen as a tentative UCG test site, and a preliminary investigation of the site has been accomplished. Although the Tono basin appears suitable for UCG testing, additional geohydrologic investigation is needed. Our effort to survey the Soviet literature is continuing; in particular, experiments that yielded results similar to those obtained at Hoe Creek have been analyzed carefully. The Soviets conducted a series of directed-flow experiments in 1955 and 1956. In each experiment, both those in which the roof subsided and those in which it did not, the product-gas heating value was quite stable throughout the gasification period and there was no general decline in heating value, as is customarily observed. (ERA citation 06:006852)

8J. Physical Oceanography

AD-A094 629/3 PC **A99**/MF **A01**
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
FRONTS Expedition CTD Data Report, 15 January - 16 February 1980, R/V THOMAS WASHINGTON.
Technical rept.,
Gunnar I. Roden. 1980, 630p Rept nos.
CONTRIB-1167, TR-384
Contract N00014-80-C-0252
Prepared in cooperation with Scripps Inst. of Oceanography, La Jolla, CA. Physical and Chemical Oceanographic Data Facility, Rept. no. PACODF-PUB-204.

The FRONTS Expedition was a multi-institutional experiment to study the subtropical front of the central North Pacific and to assess its variability in time and space. Ships, aircraft, and satellites were employed during the experiment and a broad range of measurements were carried out, ranging from microstructure to large-scale buoy trajectories. This report deals with hydrographic work carried out on the R/V THOMAS WASHINGTON. The principal objective was to measure the three-dimensional thermohaline structure in the upper 1500 m. of the ocean in a 2 deg by 2 deg latitude-longitude area centered over the subtropical front. In this area, sampling was done a 20 min by 20 min latitude-longitude grid, to bring out the relevant frontal features. The grid was occupied twice, to determine the time variability of the thermohaline structure.

AD-A094 694/7 PC **A03**/MF **A01**
Applied Science Technology, Inc., Arlington, VA.
Feasibility Study of Airborne Bathymetric Sensing Using the CO2 Laser/Acoustic Technique (Brighton Dam Test Results).
Interim rept. Sep 78-Nov 79,
G. Daniel Hickman, B. S. Maccabee, and C. E. Bell. May 80, 39p Rept no. AST-R-070580
Contract N00014-78-C-0764

A feasibility experiment was performed on a concept for a remote system for bathymetric mapping in turbid shallow waters. The concept consists of a CO2 laser transmitter and a microphone receiver. The CO2 laser is used from a platform in the air to generate an acoustic field in the water, while the microphone (in air) detects the sound pulses, after being reflected off the bottom sediment. The results of these experiments definitively proved that the CO2 laser/acoustic technique could be used to derive bathymetric data using a microphone located in the air. The possibility therefore exists that this technique could be used as the basis for a remote sensing system for shallow water bathymetry. Similar type measurements were also made of acoustic reflections from an aluminum plate located at various water depths. Calculations of the Sound Pressure Levels (SPL) are in good agreement with SPL's measured with a hydrophone in the water. However, large discrepancies exist between measured and calculated SPL's with the air-located microphone. The resolution of these discrepancies, which are thought to be due to a malfunction of the microphone, will be one of the objectives of future experiments. (Author)

AD-A094 875/2 PC **A02**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Seaflume: A Device for in-Situ Studies of Threshold Erosion Velocity and Erosional Behavior of Undisturbed Marine Muds.
Rept. for 1973-1975,
Robert A. Young. 11 Nov 76, 9p
Contracts N00014-75-C-0291, Nonr-4029(00)
Pub. in Marine Geology, v23 pM11-M18 1977. Sponsored in part by Contract NOAA-04-5-022-7 to Massachusetts Inst. of Tech., Cambridge.

No abstract available.

AD-A094 920/6 PC **A02**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Erosion of Fine-Grained Marine Sediments: Sea-Floor and Laboratory Experiments.
Rept. for 1973-1975,
Robert A. Young, and John B. Southard. 21 Oct 76, 12p Rept no. CONTRIB-3957
Contract N00014-75-C-0291
Pub. in Geological Society of American Bulletin, v89 p663-672 May 78.

No abstract available.

AD-A094 955/2 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Annual Baroclinic Rossby Waves in the Central North Pacific,
Yong Q. Kang, and Lorenz Magaard. 19 Nov 79, 10p Rept no. HIG-CONTRIB-1072
Contract N00014-75-C-0209
Pub. in Jnl. of Physical Oceanography v10 n8 p1159-1167 Aug 80.

No abstract available.

AD-A094 957/8 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Evidence for Spreading-Center Jumps from Fine-Scale Bathymetry and Magnetic Anomalies Near the Galapagos Islands,
Richard Hey. 24 Jul 78, 4p Rept no. HIG-CONTRIB-902
Contract N00014-75-C-0209, Grant NSF-OCE76-21966
Pub. in Geology, v7 n10 p505-506 1979. Sponsored in part by Grant NSF-OCE78-19816.

No abstract available.

AD-A094 958/6 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Explosive Volcanism of the Aleutian Arc: Their Spatial and Temporal Distributions in Marine Sediments; Geodynamic Implications,
Dragoslav Ninkovich, Jean-Paul Cadet, Lloyd Burckle, and Steven Hammond. 1977, 6p Rept no. HIG-CONTRIB-909
Contract N00014-75-C-0209, Grant NSF-OCE76-80690
Pub. in Compte Rendu Sommaire des Seances de la Societe Geologique de France, n5 p273-276 1977. Sponsored in part by Grant NSF-DES75-18136.

No abstract available.

AD-A094 973/5 PC **A03**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Silica Apparent Solubilities and Rates of Dissolution and Precipitation,
David C. Hurd, Charles Fraley, and James K. Fugate. 16 Nov 78, 35p Rept no. HIG-CONTRIB-917
Contract N00014-75-C-0209
Pub. in ACS Symposium Series, n93 p413-445 1979.

No abstract available.

AD-A094 992/5 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
Furrowed Mud Waves on the Western Bermuda Rise.
Journal article,
R. W. Embley, P. Lonsdale, B. E. Tucholke, P. J. Hoose, and L. Mayer. 7 Feb 80, 12p Rept no. LDGO-2995
Contract N00014-75-C-0210
Pub. in Geological Society of America Bulletin, v91 pt1 p731-740 Dec 80. Prepared in cooperation with Scripps Institution of Oceanography, La Jolla, CA. Marine Physical Lab. under Contract N00014-75-C-0704 and Woods Hole Oceanographic Institution, MA. under Contract N00014-79-C-0071, WHOI-CONTRIB-4546.

No abstract available.

AD-A095 035/2 PC **A02**/MF **A01**
Woods Hole Oceanographic Institution, MA. Dept. of Chemistry.
Organic Matter Fluxes from Sediment Traps in the Equatorial Atlantic Ocean.
Technical rept.,
Stuart B. Wakeham, John W. Farrington, Robert B. Gagosian, Cindy Lee, and Hein DeBaar. 19 Mar 80, 9p Rept nos. WHOI-81-4, WHOI-CONTRIB-4569
Contract N00014-79-C-0071, Grant NSF-OCE78-26084
Pub. in Nature, v286 n5775 p798-800, 21 Aug 80. Sponsored in part by Grants NSF-OCE78-26180 and NSF-OCE77-27004.

No abstract available.

AD-A095 039/4 PC **A03**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Disruption of the Feni Sediment Drift by Debris Flows from Rockall Bank.
Technical rept.,
R. D. Flood, C. D. Hollister, and P. Lonsdale. 1 Mar 79, 29p Rept nos. WHOI-81-8, WHOI-CONTRIB-4114

Contract N00014-74-C-0262, Grant NSF-DES73-06657
Pub. in Marine Geology, v32 p311-334 1979. Prepared in cooperation with Scripps Inst. of Oceanography, San Diego. Marine Physical Lab., Contracts N00014-75-C-0704 and N00014-75-C-0749, Grants NSF-DES74-03690 and NSF-OCE76-21592.

No abstract available.

AD-A095 176/4 PC **A03**/MF **A01**
Florida State Univ., Tallahassee. Dept. of Oceanography.
An Analysis of Hydrographic Data From Knorr Cruise 74 in HEBBLE Area, September - October 1979.
Technical rept.,
Georges L. Weatherly, and Edward A. Kelley, Jr.
Jan 81, 47p Rept no. TR-173
Contract N00014-75-C-0201

We present in figure form some of the hydrographic data collected on the Scotian Rise in September-October, 1979 as part of the HEBBLE program (Hollister et al, 1980). Five full water column theta and S cross slope transects are presented together with one sigma-4 transect for comparison. Selected surface to bottom computer geostrophic velocity profiles are also presented. To focus further on conditions near the ocean bottom, six near bottom, cross slope theta transects and theta profiles at all stations in the lowest 350 m are shown. All six near bottom theta transects show a distinct body of cold water above the bottom near the base of the Scotian Rise. The 0-350 mab theta profiles show that in this distinct body of cold water the bottom mixed layer is sometimes layered and is the distinct body of cold water. (Author)

8K. Seismology

AD-A094 644/2 PC **A05**/MF **A01**
Rondout Associates, Inc., Stone Ridge, NY.
Regional Seismic Wave Propagation.
Final rept. 15 Dec 77-30 Sep 80,
Paul W. Pomeroy, and Thomas C. Chen. 30 Nov 80, 96p 03-80-3, AFOSR-TR-81-0073
Contract F49620-78-C-0043, ARPA Order-3291

In a review of studies on the seismic phase Lg, we describe its particle motion, dispersion, spectral content, mode of propagation, and magnitude-scale; we also tabulate the regional velocity, attenuation, and propagation efficiency for this seismic phase. The characteristics of Lg-wave propagation in the eastern and western United States are compared with those in different regions of the Soviet Union. Possible discriminants such as (1) Lg vs. P amplitudes, (2) Lg/P amplitude ratios as a function of distance, (3) group velocities of Lg at amplitude maxima, and (4) Lg energy ratios are found, similar to attenuation and group velocity, to be highly dependent on the propagation path. The valid application of these quantities to the problem of earthquake-explosion discrimination will therefore require regional studies more detailed than previously assumed.

AD-A094 890/1 PC **A04**/MF **A01**
Teledyne Geotech, Alexandria, VA. Seismic Data Analysis Center.
Some Aspects of L sub g and P sub g Propagation.
Technical rept.,
Zoltan A. Der, Charmaine P. Mrazek, Eugene Smart, and B. W. Barker. 19 Mar 79, 64p Rept no. SDAC-TR-78-11
Contract F08606-78-C-0007, DARPA Order-2551

L sub g and P sub g (P) wavetrains consist of S and P waves trapped in the continental crust. The modal structure of these waves can be approximated from ray-tracing and Brune's (1964) constructive interference criteria for normal modes. Ray theory arguments show that the modes involved in L sub g and P sub g propagation are extremely sensitive to internal random inhomogeneities in the crust and small deviations of the free surface or the Moho from plane parallel surfaces. (Author)

AD-A094 914/9 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
The Reproducing Earthquakes of the Galapagos Islands,
Kris Kaufman, and L. J. Burdick. 23 Jan 80, 14p AFOSR-TR-81-0095
Contract F49620-79-C-0021
Pub. in Bull. of the Seismological Society of America, v70 n5 p1759-1770 Oct 80. Prepared in cooperation with Colorado Univ., Boulder.

No abstract available.

AD-A094 923/0 PC **A03**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
A Spectral Theory for Circular Seismic Sources; Simple Estimates of Source Dimension, Dynamic Stress Drop, and Radiated Seismic Energy,
John Boatwright. 22 May 78, 29p LDGO-2939, AFOSR-TR-81-0098
Contract F49620-77-C-0098
Pub. in Bulletin of the Seismological Society of America, v70 n1 p1-27 Feb 80.

No abstract available.

AD-A094 924/8 PC **A02**/MF **A01**
California Inst. of Tech., Pasadena. Seismological Lab.
Modeling the Long-Period Body Waves from Shallow Earthquakes at Regional Ranges,
D. V. Helmberger, and G. R. Engen. 4 Feb 80, 18p CONTRIB-3393, AFOSR-TR-81-0096
Contract F49620-77-C-0022
Pub. in Bulletin of the Seismological Society of America, v70 n5 p1699-1714 Oct 80.

No abstract available.

AD-A094 928/9 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
The Focal Mechanisms of The Gazli, USSR, Earthquakes,
M. J. Kristy, L. J. Burdick, and D. W. Simpson. 11 Feb 80, 16p LDGO-3037, AFOSR-TR-81-0097
Contract F49620-79-C-0021
Pub. in Bulletin of the Seismological Society of America, v70 n5 p1737-1750 Oct 80.

No abstract available.

COO-3134-31 PC **A05**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
Comprehensive Study of the Seismotectonics of the Eastern Aleutian Arc and Associated Volcanic Systems. Annual Progress Report, March 1, 1980-February 28, 1981.
K. H. Jacob, J. N. Davies, and L. House. 1981, 76p
Contract AS02-76ER03134

Refined hypocenter locations beneath the Shumagin Islands seismic network of the eastern Aleutian arc, Alaska, provide for the first time conclusive evidence for a double-sheeted dipping seismic (Benioff) zone in this arc. This refined seismicity structure was obtained in the arc section centered on the Shumagin seismic gap. A thorough review of three seismic gaps in the eastern Aleutian arc shows a high potential for great earthquakes within the next one to two decades in the Shumagin and Yakataga seismic gaps, and a less certain potential for a large or great earthquake in the possible Unalaska gap. A tilt reversal was geodetically observed to have occurred in 1978/79 in the forearc region of the Shumagin gap and could indicate the onset of a precursory strain relief episode prior to a great quake. A comparative study of the Pavlof volcano seismicity with that of other recently active volcanoes (i.e., Mt. St. Helens) indicates that island-arc (explosive-type) volcanoes respond to small ambient, periodic stress changes (i.e., tides). Stress drop measurements from earthquakes on the main thrust zone indicate high stress drops within the seismic gap regions of the Aleutian arc and low stress drops outside the gap region. (ERA citation 06:008322)

DOE/NV/10054-1 PC **A05**/MF **A01**
Mackay School of Mines, Reno, NV.
Bulletin of the Seismological Laboratory, January 1, 1975-December 31, 1979.
G. M. Smith, and F. D. Ryall. Nov 80, 87p
Contract AC08-79NV10054

The determination of epicenters for earthquakes located in the western Great Basin, Nevada and eastern California, for the period 1975 to 1979 is summarized. The Laboratory attempts to identify and locate all earthquakes with M/sub L/ greater than about 2.5 in this region. (ERA citation 06:008323)

LA-8580-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Earthquake Catalog for Northern New Mexico. Progress Report, January 1980-March 1980.
D. J. Wechsler, D. J. Cash, K. H. Olsen, N. J. McFarland, and J. J. Wolff. Oct 80, 12p
Contract W-7405-ENG-36

This report is a summary of the earthquakes in northern New Mexico located by the Los Alamos Scientific Laboratory seismic array. Data are presented in the form of tables and epicenter maps, with a brief explanatory text. (ERA citation 06:008324)

PB81-153397 PC **A04**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Simulating and Analyzing Artificial Non-Stationary Earthquake Ground Motions,
Robert F. Nau, Robert M. Oliver, and Karl S. Pister. Oct 80, 69p UCB/EERC-80/36

This report describes models used to simulate earthquake accelerograms and analyses of these artificial accelerogram records for use in structural response studies. The artificial accelerogram records are generated by a class of linear difference equations which have been previously identified as suitable for describing strong ground motions. The major contributions of the report are the use of Kalman filters for estimating time-varying model parameters, and the development of an effective non-parametric method for estimating the variance envelopes of the accelerogram records.

8L. Snow, Ice, and Permafrost

AD-A094 620/2 PC **A02**/MF **A01**
Cold Regions Research and Engineering Lab., Hanover, NH.
Modeling of Anisotropic Electromagnetic Reflection from Sea Ice,
Kenneth M. Golden, and Stephen F. Ackley. Oct 80, 25p Rept no. CRREL-80-23
Grant NSF-DPP77-24528

The contribution of brine layers to observed reflective anisotropy of sea ice at 100 MHz is quantitatively assessed. The sea ice is considered to be a stratified, inhomogeneous, anisotropic dielectric consisting of pure ice containing ordered arrays of conducting inclusions (brine layers). Below the transition zone, the ice is assumed to have constant azimuthal c-axis orientation within the horizontal plane, so that the orientation of brine layers is uniform. The brine layers are also assumed to become increasingly well-defined with depth, since adjacent brine inclusions tend to fuse together with increasing temperature. A theoretical explanation for observed reflective anisotropy is proposed in terms of anisotropic electric flux penetration into the brine layers. Penetration anisotropy and brine layer geometry are linked to anisotropy in the complex dielectric constant of sea ice. In order to illustrate the above effects we present a numerical method of approximating the reflected power of a plane wave pulse incident on a slab of sea ice. Mixture dielectric constants are calculated for two polarizations of the incident wave: (1) the electric field parallel to the c-axis direction, and (2) the electric field perpendicular to the c-axis direction. These dielectric constants are then used to calculate power reflection coefficients for the two polarizations. Significant bottom reflection (R approximates 0.08) occurs when the polarization is parallel to the c-axis. However, when the polarization is perpendicular to the c-axis, the return may be

almost completely extinguished (R less than 0.001). (Author)

AD-A094 621/0 PC **A02**/MF **A01**
Cold Regions Research and Engineering Lab., Hanover, NH.
Measurement of the Shear Stress on the Underside of Simulated Ice Covers,
Darryl J. Calkins, and Andreas Mueller. Oct 80, 19p Rept no. CRREL-80-24

The fluid shear stress applied to the underside of a simulated floating ice cover was measured in a laboratory flume. The measured values were compared with values of the shear stress computed from the von Karman-Prandtl velocity distribution fitted to the velocity profiles measured beneath the cover. For the lower velocity runs (approx 0.079 m/s) the measured and computed values of the shear stress were in close agreement. At the high velocity flows (approx 0.137 m/s) the measured values were roughly one-half those calculated from the velocity distribution. As the underside of the cover became increasingly rougher, the position of maximum velocity moved closer to the bottom of the channel. It was shown that the Darcy friction coefficient is exponentially related to a normalized ice cover thickness, which suggests that it is measure of the roughness of a fragmented ice cover. (Author)

AD-A094 622/8 PC **A02**/MF **A01**
Cold Regions Research and Engineering Lab., Hanover, NH.
Single and Double Reaction Beam Load Cells for Measuring Ice Forces,
P. R. Johnson, and J. P. Zarling. Oct 80, 22p Rept no. CRREL-80-25

Two new types of load cells for attachment to bridge piers and direct measurement of ice forces were developed and tested with one type being installed on a pier of the Yukon River Bridge northwest of Fairbanks, Alaska. Both types of load cells used beams supported by base plates and carried nose plates that were loaded by the ice. The loads were imposed at the beams at locations differing from the support reactions so that the loads developed moments in the beams. By instrumenting them with strain gauges, the loads could be measured. Details of the design of the load cells, the means of calculating the loads and experience obtained with load cells are discussed. (Author)

AD-A094 953/7 PC **A02**/MF **A01**
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
Frazil Ice in Rivers and Oceans.
Technical rept.,
Seelye Martin. 1981, 20p Rept nos. TR-40, CONTRIB-541
Contract N00014-76-C-0234
Pub. in Annual Review of Fluid Mechanics, v13 p379-397 1981. Also available as Rept. no. CONTRIB-1161.

No abstract available.

AD-A095 117/8 PC **A03**/MF **A01**
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
Annual Report Number 12, 1 October 1979-30 September 1980,
Seelye Martin, and Gary Maykut. 1 Dec 80, 30p
Contract N00014-76-C-0234

The report summarizes research performed under Contract N00014-76-C-0234, NR 307-252, during the year 1 October 1979-30 September 1980. Research topics include: (1) growth of ice in a wave field, (2) large-scale heat exchange and ice production, (3) interaction of solar radiation with the ice and upper ocean, (4) optical properties of ice and snow, (5) generalized radiative transfer modeling, (6) wave propagation and other ice edge phenomena. (Author)

8M. Soil Mechanics

DOE/LC/10787-59 PC **A03**/MF **A01**
Olgeirson (Erik R.) Associates, Conifer, CO.
Soil Studies. Soil Inventory Studies: Mapping and Description.
E. R. Olgeirson. 1979, 28p
Contract FC20-78LC10787

Soils on the Geokinetic Oil Shale Project site in Uintah County, Utah are described, classified and mapped. This interim report contains baseline information for soil series. Preliminary identification was made using black and white aerial photography and later verified in the field. Soil units are classified according to the USDA soil nomenclature. (ERA citation 06:008129)

DOE/LC/10787-60 PC **A03**/MF **A01**
Olgeirson (Erik R.) Associates, Conifer, CO.
Soil Studies: Physical and Chemical Analysis, Native and Retort Soils.
E. R. Olgeirson. 1979, 31p
Contract FC20-78LC10787

This report contains data from the physical and chemical analysis of native soils and retort soils from the Geokinetics Oil Shale Site, Uintah County, Utah. Four native soil types were sampled: loam, JR loam, Havre silt loam, and Luhon loam. Samples from retort soils were collected at 15 cm depths before and after the completion of the retorting process. There are no apparent differences between native soil types and retort soils. (ERA citation 06:008121)

PB81-140014 (Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Nanjing (China). Nanjing Inst. of Soil Science.
Correlation Analysis of Organic Matter Content and Spectral Reflection Properties of the Soil in Southern Xinjiang,
Xu Jinjin, and Dai Changda. 24 Jul 79, 8p
Included in Scientia Sinica, v25 n12 p1043-1045 Dec 80.

Organic matter is one of the important components of soil. Many properties of soil have direct or indirect connection with its organic matter content. Therefore, the correlation analysis of spectral reflection properties and organic matter content in soil is of significance to the soil study by remote sensing. In this paper, the soil in Southern Xinjiang is taken as an example for discussion.

PB81-155251 PC **A99**/MF **A01**
Environmental Protection Agency, Washington, DC. Office of Pesticides and Toxic Substances.
Soil Biology as Related to Land Use Practices: Proceedings of the International Soil Zoology Colloquium (7th) of the International Society of Soil Science (ISSS) Held at Syracuse, New York on July 29-August 3, 1979,
Daniel L. /Dindal
1980, 898p EPA-560/13-80-038
Prepared in cooperation with State Univ. of New York at Syracuse. Coll. of Environmental Science and Forestry.

Partial contents:
- Influence of pesticides on soil organisms;
- Human waste disposal and soil organisms;
- Anthrophilic relationships of soil organisms;
- Relationships of soil organisms to agronomic practices and animal wastes;
- Influence of mining site modification and rehabilitation of soil organisms;
- Effects of silvicultural practices on soil organisms;
- Human impact on tropical soil ecology;
- Basic soil ecology;
- Nutrient cycling, microorganism-faunal relationships, feeding and reproductive strategies.

8N. Terrestrial Magnetism

AD-A094 962/8 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Geomagnetic Polarity Transitions in Two Fully Oriented Sediment Cores from the Northwest Pacific,
Stephen Hammond, Stephen Seyb, and Fritz Theyer. 24 Jul 78, 10p Rept no. HIG-CONTRIB-973
Contract N00014-75-C-0209
Pub. in Earth and Planetary Science Letters, v44 p167-175 1979.

No abstract available.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

AD-A094 682/2 PC **A06**/MF **A01**
Frequency Electronics, Inc., New Hyde Park, NY.
Vibration Resistant Quartz Crystal Resonators.
Interim rept. no. 2, 28 Feb-27 Aug 80,
B. Goldfrank, and A. Warner. Jan 81, 110p
DELET-TR-79-0272-2
Contract DAAK20-79-C-0272

The objectives of this investigation are to provide doubly rotated quartz crystal resonators that exhibit fast warm-up and low 'g' sensitivity. Warm-up is to be on the order of 1 PP 10 to the 9th power in three minutes. The 'g' sensitivity is to be 1 PP 10 to the 10th power maximum in any axis. (Author)

AD-A094 882/8 PC **A02**/MF **A01**
Rome Air Development Center, Hanscom AFB, MA. Deputy for Electronic Technology.
Multimoding in SAW Convolver Waveguides,
Roger D. Colvin, and E. J. Charlson. 5 Jun 80, 5p Rept no. RADC/ETR-81-0001
Pub. in IEEE Transactions on Sonics and Ultrasonics, vSU-27 n6 p385-388 Nov 80.

No abstract available.

LA-UR-80-2344 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Dc Arc Interruption in Pressurized Gasses.
P. Chowdhuri. 1980, 9p CONF-810201-1
Contract W-7405-ENG-36
IEEE Power Engineering Society meeting, Atlanta, GA, USA, Feb 1981.

The purpose of the study was to investigate the possibility of achieving (1) short interruption time and (2) minimum contact erosion in a dc circuit interrupter. Arc interruption tests were performed on a 100-A, 600-V dc contactor under atmospheres of argon dry air, nitrogen, helium and hydrogen, each at four pressures 0.17, 0.34, 0.52, and 0.69 MPa (25, 50, 75 and 100 psig). It was found that the average arcing time in helium and hydrogen was the shortest, and that in argon the longest for the circuit conditions used. The contact erosion in hydrogen was the worst, and that in argon the best for the contact materials used in the tests. The static pressure in the chamber did not appear to have much effect on the arc interruption phenomenon for the contactor and gas pressures used. (ERA citation 06:007718)

N81-16040/0 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Moffett Field, CA. Ames Research Center.
Sample Data Effects of High-Pass Filters.
D. O. Chin. Jan 81, 32p NASA-TP-1797, A-8361

Four mathematical models of linear first and second order high pass washout filters were ana-

lyzed. These models were Euler's Integration, Zero-Order Hold, Bilinear Transformation, and Second-Order Adams-Bashforth Integration. Bode responses for each model at various sample rates were compared to the continuous filter response. Higher sample rates produced Bode responses approaching the continuous response and the Bilinear Transformation model produced the best responses over the frequency spectrum and sample rates. Pole location analysis of each model in the z-plane showed the Bilinear Transformation and Zero-Order Hold models gave stable poles regardless of time step size, whereas the other models did not display stable poles. A near constant gain error over the entire frequency spectrum was discovered in the Zero-Order Hold cases and a correction gain was calculated for the first-order high-pass filter case.

N81-16389/1 PC **A03**/MF **A01**
TRW Systems Group, Redondo Beach, CA.
K-Band High Power Latching Switch.
Final Report.
M. J. Mlinar, W. S. Piotrowski, and J. E. Raue. 19 Dec 80, 49p NASA-CR-165159, REPT-34037
Contract NAS3-21761

A 19 GHz waveguide latching switch with a bandwidth of 1400 MHz and an exceptionally low insertion loss of 0.25 dB was demonstrated. The RF and driver ferrites are separate structures and can be optimized individually. This analysis for each structure is separately detailed. Basically, the RF section features a dual turnstile junction. The circulator consists of a dielectric tube which contains two ferrite rods, and a dielectric spacer separating the ferrite parts along the center of symmetry of the waveguide to form two turnstiles. This subassembly is indexed and locked in the center of symmetry of a uniform junction of three waveguides by the metallic transformers installed in the top and bottom walls of the housing. The switching junction and its actuating circuitry met all RF performance objectives and all shock and vibration requirements with no physical damage or performance degradation. It exceeds thermal requirements by operating over a 100 C temperature range (-44 C to +56 C) and has a high power handling capability allowing up to 100 W of CW input power.

PAT-APPL-6-080 725 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method for Forming Low-Resistance Ohmic Contacts on Semiconducting Oxides.
Patent Application,
J. Narayan. Filed 1 Oct 79, 14p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention provides a new method for the formation of high-quality ohmic contacts on wide-band-gap semiconducting oxides. As exemplified by the formation of an ohmic contact on n-type BaTiO sub 3 containing a p-n junction, the invention entails depositing a film of a metallic electroding material on the BaTiO sub 3 surface and irradiating the film with a Q-switched laser pulse effecting complete melting of the film and localized melting of the surface layer of oxide immediately underlying the film. The resulting solidified metallic contact is ohmic, has unusually low contact resistance, and is thermally stable, even at elevated temmperatures. The contact does not require cleaning before attachment of any suitable electrical lead. This method is safe, rapid, reproducible, and relatively inexpensive. (ERA citation 06:005173)

PB81-139883
(Order as PB81-139859, PC **A05**/MF **A01**)
Chengdu Inst. of Radio Engineering (China).
Recommendation and Reference Table of Rigid Elliptical Waveguide Data,
Lin Weigan. 21 Dec 79, 3p
Included in Scientia Sinica, v25 n12 p985-987 Dec 80.

No abstract available.

PB81-159238
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Shanghai (China). Shanghai Inst. of Organic Chemistry.
Photo-Respond Characteristics of the Junction Field Effect Transistor and its Application in UV-Detector,
Hui Yongzheng, Shen Qi, and You Zhaolin. 16 Jan 79, 11p
Included in Scientia Sinica, v23 n10 p1247-1257 Oct 80.

The photo-field effect transistor (photo-FET) with high sensitivity can be got from commercial n-channel junction FET according to the parameters, such as input resistance, source-drain current at zero bias (I sub DSS) and transconductance. As compared with other photoelements, the photo-FET has some advantages as follows: wide linear dynamic range useful at 0.001 - 10,000 lux, spectral range from UV to near IR, low output impedance, and the special characteristics as applied to measuring absorbance directly. The authors have discussed the influence of some factors on the photosensitivity, such as external bias, effect of transconductance on photo-FET used as a light intensity on absorbance measuring device. With this new element, a single dual beam UV-detector has been assembled on a laboratory-made high-speed liquid chromatograph.

UCID-18831 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Basic Principles Governing the Design of Magnetic Switches.
D. L. Birx, E. J. Lauer, L. L. Reginato, J. Schmidt, and M. Smith. 18 Nov 80, 26p
Contract W-7405-ENG-48

The idea of using saturable reactors as the basis of high power pulse generators is not a new concept, but there have been few recent applications of this technology. Here the principle of magnetic pulse generation is briefly described and some of the basic guidelines used to design these circuits are discussed. A demonstration of the principles by a small scale pulse amplifier is presented, and finally there is an extrapolation to a large scale system. (ERA citation 06:006405)

9B. Computers

AD-A094 617/8 PC **A11**/MF **A01**
Naval Postgraduate School, Monterey, CA.
A Methodology for the Conversion of Tactical Board Games to Computer Assisted War Games.
Master's thesis,
William Clifton Griggs, and John Arthur Thompson, Jr. Sep 80, 247p

As part of the development of the capabilities of the Command, Control and Communications (C3) Laboratory at the Naval Postgraduate School, there was a need for an in-house computer assisted tactical war game. The objective of this thesis was to satisfy that need. An anti-submarine warfare board game, UP SCOPE°, which was designed, developed and produced by Simulations Productions, Inc. of New York, was used as the model. This thesis provides an interactive computer assisted anti-submarine warfare war game called 'Up Scope' which is written in FORTRAN. This thesis also develops a framework for any future computer adaptation of a tactical board game, details a players manual and gives full documentation of the computer programming. Program listings, a sample game and several tactical scenarios are also included. (Author)

AD-A094 619/4 PC **A03**/MF **A01**
Naval Postgraduate School, Monterey, CA.
Software System Safety.
Final rept. for period ending Sep 80,
Donald M. Layton. Oct 80, 30p Rept no. NPS67-80-013

An examination of software system safety analysis has been made and generalized techniques examined. These techniques parallel the techniques used for hardware analysis and are, in fact, predicted on the fact that the only safety perturbation in software is one that directs or misdirects a hardware component. Discussion is presented for a top to bottom and a bottom up hierarchial analysis, as well as an integrated technique. (Author)

AD-A094 650/9 PC **A03**/MF **A01**
Harvard Univ., Cambridge, MA. Aiken Computation Lab.
Distributed Algorithms for Synchronizing Interprocess Communication Within Real Time,
John H. Reif, and Paul Spirakis. 1980, 26p Rept no. TR-23-80
Contract N00014-80-C-0647, Grant NSF-MCS79-21024

This paper considers a fixed (possibly infinite) set, pi, of distributed asynchronous processes which at various times are willing to communicate with each other. We describe probabilistic algorithms for synchronizing this communication with boolean 'flag' variables, each of which can be written by only one process and read by at most one other process. With very few assumptions (the speeds of processes may vary in time within fixed arbitrary bounds, and the processes may be willing to communicate with a time varying set of processes (but bounded in number), and no probability assumptions about system behavior) we show our synchronization algorithms have real time response: if at any time a pair of processes are mutually willing to communicate, they establish communication within a constant time interval, with high likelihood (for the worst case behavior of the system). Our communication model and synchronization algorithms are quite robust and can be applied to solve a large class of resource synchronization problems, as well as implement Dijkstra's CSP in real time. (Author)

AD-A094 691/3 PC **A02**/MF **A01**
California Univ., Berkeley. Electronics Research Lab.
Proposal for Configuration Control for the ARPA Standard Version of the UNIX Operating System.
Technical rept.,
R. S. Fabry. 1980, 4p
Contract N00039-80-K-0649, ARPA Order-4031

The ARPA Standard Version of the UNIX Operating System ('the System') shall consist of the original Western Electric Version 7 UNIX software and documentation as modified and enhanced by the Contractor according to this agreement. (Author)

AD-A094 786/1 PC **A02**/MF **A01**
Washington Univ., Seattle. Dept. of Computer Science.
Optimal Placement of Identical Resources in a Distributed Network.
Technical rept.,
Michael J. Fischer, Nancy D. Griffeth, Leo J. Guibas, and Nancy A. Lynch. Jan 81, 18p Rept no. TR-81-01-03
Contract N00014-80-C-0221
Prepared in cooperation with Georgia Inst. of Tech., Atlanta. Contracts N00014-79-C-0873 and DAAG29-79-C-0155.

The problem is considered of locating a number of identical resources at nodes of a tree so as to minimize the total expected cost of servicing a set of random requests for the resources. The cost of servicing a request is the tree distance from the requesting node to the node at which the resource satisfying the request is located. An algorithm for finding an optimal placement of resources is presented.

AD-A094 814/1 PC **A07**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Methodology for Validation of Complex Multi-Variable Military Computerized Models.
Master's thesis,
Craig S. Ghelber, and Charles A. Haley. Dec 80, 126p Rept no. AFIT/GOR/MA/80D-3

Computerized simulation models that are characterized by multi-variables and minimal or nonexistent real world supporting data are often used with-

out being properly validated. The towards-validation methodology is introduced as a four-phase approach for validating these complex models and is defined as: The document evidence that a computerized model can provide users verifiable insight, within the model's domain of application, for the purpose of formulating analytical or decision-making inferences. Towards-validation begins with the conceptual phase of model development. Next, the verification phase examines the mechanical validity of model design. The third phase, credibility, is concerned with both intuitive and statistical appeal. The final phase deals with confidence building and documentation. To illustrate the application of towards-validation, the Headquarters Air Force version of the Interceptor War Game Model is examined. Results are documented in a user's guide. (Author)

AD-A094 922/2 PC **A03**/MF **A01**
Command and Control Technical Center, Washington, DC.
The H-6000 Tuning Guide. Volume IV. Appendixes. Revision 1. Changes 1 and 2.
Final rept.,
Barry M. Wallack, and George Gero. 12 Oct 79, 30p Rept no. CCTC-TM-180-78-vol4-rev1-chg1/2 Changes 1 and 2 to report dated 1 Sep 78, AD-B032 285. See also Volume 3, AD-A073 133.

This document can be used by computer site personnel to analyze the performance characteristics of their Honeywell 6000 computer systems. This document is the fourth volume of a set of four volumes. This volume provides the appendixes referenced by the other volumes of the Tuning Guide. (Author)

AD-A094 930/5 PC **A09**/MF **A01**
Department of Defense, Washington, DC.
Military Standard JOVIAL (J73).
6 Jun 80, 179p Rept no. DOD-MIL-STD-1589B Supersedes Rept. no. MIL-STD-1589A dated 15 Mar 79, AD-A081 927.

This document is the revised MIL-STD-1589B Draft (USAF) definition of the upgraded J73 JOVIAL programming language. The sections are organized in a top-down manner. The first section describes the interactions between the modules of the complete program so that in subsequent sections the structures of the language can be described (to the extent possible) without reference to their interaction with other structures. Most sections are divided into separate parts entitled 'Syntax,' 'Semantics,' and 'Constraints.' The 'Syntax' descriptions define the grammar of the language in a modified BNF notation. The 'Semantics' discussions define the meaning of constructs that satisfy the Syntax and Constraints. The 'Constraints' discussions enumerate non-syntactic requirements that must be met in order for the given constructs to be legal. The intent is that the Syntax, Semantics, and Constraints not be redundant with each other. Some of the designated Constraints apply at compile time, and others pertain to errors that are not detectable until the compiled program is executed. In order to conform to this standard, a J73 compiler must detect compile-time errors, but it is not required to generate code for run-time checks.

AD-A095 012/1 PC **A08**/MF **A01**
Naval Postgraduate School, Monterey, CA.
Numerical Optimization Using Desktop Computers.
Master's thesis,
Walter Bacon Cole. Sep 80, 165p

Two computer programs were developed in advanced BASIC to perform numerical optimization of a user supplied design problem on the Hewlett Packard 9845A desktop computer. An executive program, OPCON, provides the interactive link between the computer user and the DESOP numerical optimization program. DESOP performs the numerical optimization using the sequential unconstrained minimization technique with an external penalty function. The unconstrained subproblem is solved using the Fletcher-Reeves method of conjugate directions, and using Golden Section search and polynomial interpolation in the one-dimensional search. A computer subprogram, NISCO, was developed in advanced BASIC to model a nonimaging concentrating compound parabolic trough solar collector. Thermophysical, geophysical, optical and economic analyses were used to compute a life-cycle fuel savings, for a design of stated thermal capacity. NISCO was coupled to the OPCON/DESOP optimization program to find the design which maximizes the life-cycle fuel savings. (Author)

AD-A095 020/4 PC **A04**/MF **A01**
Naval Postgraduate School, Monterey, CA.
ATHENA: Users Manual for Interactive Analysis of Large-Scale Optimization Models.
Technical rept.,
Gordon H. Bradley, Gerald G. Brown, and Panagiotis I. Galatas. Apr 80, 55p Rept no. NPS52-80-006

Analyses of solutions for large-scale optimization models are very difficult without effective computer aids. Solution reports may require weeks to design, implement and produce with conventional report writing systems. ATHENA has been developed to allow extremely efficient immediate interactive storage and analysis of the solution file from any optimization system. ATHENA is easy to learn and use; user friendly features are provided which can preemptively assess the potential cost and implications of each request for solution information, assist the confused user, and provide the required solution information with very fast response time. The user is provided with extensive search under mask and compound logical relational constructs, as well as the capability to quickly diagnose suspicious model symptoms, and to format and issue offline reports. ATHENA is implemented in portable FORTRAN, with a parser and interpreter easily modified and expanded to suit particular hardware environments and user demands. The system has been initially designed and tuned for large-scale problems with up to 30,000 rows and columns. Live test demonstrations show that the system exhibits very fast response time in actual use. This report presents a users manual for the prototype ATHENA query language, an error message directory, and a description of interface and extension provisions.

AD-A095 075/8 PC **A02**/MF **A01**
Arizona Univ., Tucson. Optical Sciences Center.
Image Processing.
Final rept.,
B. Roy Frieden. Feb 81, 11p ARO-13836.4-EL, ARO-16018.2-EL
Grants DAAG29-77-G-0182, DAAG29-79-G-0041
Sponsored in part by Grant DAAG29-76-G-0283.

This report is a synopsis of work performed under ARO auspices during 1976-1980 on problems in image processing. The main problem areas under investigation were image restoration, image smoothing and the missing phase problem of speckle interferometry. Three algorithms were developed to attack these problems: the median window restoring method, the maximum entropy restoring method, and the maximum information restoring method. Additional algorithms were developed for estimating point spread functions, for finding the optical pupil that relays a maximum of object information to the image, and for analyzing the signal-dependent properties of noise in White Sands Missile Range vidicon system. (Author)

AD-A095 109/5 PC **A08**/MF **A01**
Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.
Design Concepts for an Optical Numerical Computer Based on the Residue Number System.
Final rept. Aug-May 79,
Anthony M. Tai, Ivan Cindrich, James R. Fienup, and Carl C. Aleksoff. Jun 79, 171p Rept no. ERIM-136800-14-F
Contract DASG60-78-C-1035

In this report, the residue number system is reviewed and various implementation concepts for a residue based numerical optical processor are presented. A detailed design for an optical processor based on the mapping approach is given. A preliminary estimate on the performance levels are provided together with recommendations on immediate and future developmental needs and plans. (Author)

AD-A095 169/9 PC **A06**/MF **A01**
Earth Science Consulting and Technology Corp., Costa Mesa, CA.
Radar, Thermal Infrared, and Panchromatic Image Collection and Analysis. Multi-Source Image Analysis.
Contract rept.,
David D. Steller, Jeffrey W. Adams, and William Muir. Dec 80, 109p ETL-0249
Contract DAAK70-78-C-0180
Addendum to Rept. no. ETL-0208, AD-A086 332.

The addendum to the Multi-Source Image Analysis contract consists of a reference set of simultaneously collected remote sensor data designed to evaluate terrain features. Airborne radar, thermal infrared, and panchromatic imagery was collected by the Oregon Army National Guard at the Corvallis, Oregon, test site on 13 and 19 August 1980. Ground teams collected radiant and air temperatures, ground site photographs and soil samples from three traverses through the test area.

ANL-79-71(V.2) PC **A11**/MF **A01**
Argonne National Lab., IL.
Interim Report on the Development and Application of Environmental Mapped Data Digitization, Encoding, Analysis, and Display Software for the ALICE System. Volume II.
L. W. Amiot, R. J. Lima, S. D. Scholbrock, C. B. Shelman, and R. H. Wehman. Jun 79, 230p
Contract W-31-109-ENG-38

Volume I of An Interim Report on the Development and Application of Environmental Mapped Data Digitization, Encoding, Analysis, and Display Software for the ALICE System provided an overall description of the software developed for the ALICE System and presented an example of its application. The scope of the information presented in Volume I was directed both to the users and developers of digitization, encoding, analysis, and display software. Volume II presents information which is directly related to the actual computer code and operational characteristics (keys and subroutines) of the software. Volume II will be of more interest to developers of software than to users of the software. However, developers of software should be aware that the code developed for the ALICE System operates in an environment where much of the peripheral hardware to the PDP-10 is ANL/AMD built. For this reason, portions of the code may have to be modified for implementation on other computer system configurations. 11 tables. (ERA citation 04:057521)

BMFT-FB-DV-79-01 PC **A16**/MF **A01**
Bundesministerium fuer Forschung und Technologie, Bonn-Bad Godesborg (Germany, F.R.).
Real Time Computer System with Distributed Microprocessors.
D. Heger, H. Steusloff, and M. Syrbe. 1979, 364p In German.
U.S. Sales Only.

The usual centralized structure of computer systems, especially of process computer systems, cannot sufficiently use the progress of very large-scale integrated semiconductor technology with respect to increasing the reliability and performance and to decreasing the expenses especially of the external periphery. This and the increasing demands on process control systems has led the authors to generally examine the structure of such systems and to adapt it to the new surroundings. Computer systems with distributed, optical fibre-coupled microprocessors allow a very favourable problem-solving with decentralized controlled buslines and functional redundancy with automatic fault diagnosis and reconfiguration. A fit programming system supports these hardware properties: PEARL for multicomputer systems, dynamic loader, processor and network operating system. The necessary design principles for this are proved mainly theoretically and by value analysis. An optimal overall system of this new generation of process control systems was established, supported by results of 2 PDV projects (modular operating systems, input/output colour screen system as control panel), for the purpose of testing by apllying the system for the control of 28 pit furnaces of a steel work. (Atomindex citation 11:532194)

DOE/ET/28354-1/2 PC **A05**/MF **A01**
Analytic Sciences Corp., Reading, MA.

User's Manual for Covariance and Hypothesis Testing Program.
J. T. Parr, G. P. Bogar, and D. H. Johnson. Jun 78, 94p
Contract AC02-76ET28354

Statistical computer programs are described which are intended for general usage in evaluating multidimensional feature indices for resource potential. In particular, the computer programs comprise a covariance computation program and a likelihood function evaluation program. These programs have been exercised in this study for geothermal exploration, using as many as 34 selected feature indices from a data base that may include up to 100 distinct indices. It is anticipated that many more indices might be considered simultaneously. Practical limitations occur with large covariances due to numerical errors in computing eigenvalues and eigenvectors. The basic concept of hypothesis testing as formulated in this study is described. (ERA citation 06:007619)

HEDL-SA-2215-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Development of a Standard for Computer Program Verification and Control.
T. E. Dunn, and O. Ozer. 1980, 10p CONF-801107-46
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

It is expected that adherence to the guidelines of the ANS 10.4 will: 1. Provide confidence that the program conforms to its requirements specification; 2. Provide confidence that the computer program has been adequately evaluated and tested; 3. Provide confidence that program changes are adequately evaluated, tested, and controlled; and 4. Enhance assurance that reliable data will be produced for engineering, scientific, and safety analysis purposes. (ERA citation 06:006089)

IPNO-T-79-07 PC **A09**/MF **A01**
Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.
Software Tools for the Simple Processing of a Real-Time System Input/Output. Application to the Survey/Check of a Ion Source by a Mini-Computer.
These (3e Cycle),
Y. Laudillay. 1979, 197p
In French.
U.S. Sales Only.

This I/O software is composed by the set of modules allowing exchanges of data between computer and process to control. It is developed taking several types of problems into account. Particularly the use of I/O must be easy for the pedestrian and I/O system should be able to evolve because the number of parameters can increase or lessen and also, the characteristics of some parameters can change. The respect of these conditions requires some particular solutions. For example, it is preferable for the control process software to be written in high level language and the I/O software to be accessible in this language. It is important, also that hardware and software intermediate levels for exchanges of data be easy for user writing a program. The other problems, typical of the real time check are determined by use of the computer standard I/O. However some further modules are necessary to obtain a real time I/O system having satisfying performances. (Atomindex citation 11:526043)

JINR-R-10-12635 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods.
Use of the MIKAM-1 Microprocessor Controller for Collection and Processing of Nuclear Radiation Spectra.
E. M. Gleibman, and S. I. Tyutyunnikov. 1979, 8p
In Russian.
U.S. Sales Only.

Two possible variants of CAMAC-system intended to collect and process amplitude spectra of nuclear radiations using a microprocessor controller, memory units and CAMAC standard modules are given. The dead time of the first variant is 80 - 100 mu s and of the second variant is 2 - 3 mu s. The systems were used for aquisition and processing spectra obtained from Ge(Li) detectors under irradiating targets by accelerated ions on the heavy ion collective accelerator. (Atomindex citation 11:532190)

LA-8631-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Standard File Transport Protocol.
G. E. Chorn, R. D. Christman, and C. T. Klingner. Dec 80, 30p
Contract W-7405-ENG-36

The Standard File Transport is the method used to transfer files between the components of the Los Alamos Scientific Laboratory's (LASL's) Integrated Computer Network (ICN). The basic file transport protocol; the special features, such as parameter negotiation and recovery, that are essential to successful file transfer in a network; and details of the file transport requests and responses are discussed. 8 figures. (ERA citation 06:008509)

N81-16493/1 PC **A04**/MF **A01**
Kentron International, Inc., Hampton, VA.
FRANOPP: Framework for Analysis and Optimization Problems User's Guide.
K. M. Riley. Jan 81, 75p NASA-CR-165653
Contract NAS1-16000

Framework for analysis and optimization problems (FRANOPP) is a software aid for the study and solution of design (optimization) problems which provides the driving program and plotting capability for a user generated programming system. In addition to FRANOPP, the programming system also contains the optimization code CONMIN, and two user supplied codes, one for analysis and one for output. With FRANOPP the user is provided with five options for studying a design problem. Three of the options utilize the plot capability and present an indepth study of the design problem. The study can be focused on a history of the optimization process or on the interaction of variables within the design problem.

N81-16512/8 PC **A08**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.
Concepts for on-Board Satellite Image Registration, Volume 1.
W. H. Ruedger, D. R. Daluge, and J. V. Aanstoos. Jun 80, 155p NASA-CR-159287, RTI/1796/00-01F-V-1
Contract NAS1-15768

The NASA-NEEDS program goals present a requirement for on-board signal processing to achieve user-compatible, information-adaptive data acquisition. One very specific area of interest is the preprocessing required to register imaging sensor data which have been distorted by anomalies in subsatellite-point position and/or attitude control. The concepts and considerations involved in using state-of-the-art positioning systems such as the Global Positioning System (GPS) in concert with state-of-the-art attitude stabilization and/or determination systems to provide the required registration accuracy are discussed with emphasis on assessing the accuracy to which a given image picture element can be located and identified, determining those algorithms required to augment the registration procedure and evaluating the technology impact on performing these procedures onboard the satellite.

N81-16759/5 PC **A15**/MF **A01**
Intermetrics, Inc., Cambridge, MA.
Hal/S Language Specification. Version IR-542.
1 Sep 80, 338p NASA-CR-160910
Contract NAS9-13864

The formal HAL/S language specification is documented with particular referral to the essentials of HAL/S syntax and semantics. The language is intended to satisfy virtually all of the flight software requirements of NASA programs. To achieve this, HAL/S incorporates a wide range of features, including applications oriented data types and organizations, real time control mechanisms, and constructs for systems programming tasks.

N81-16760/3 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
A User's Guide for DTIZE an Interactive Digitizing and Graphical Editing Computer Program.
C. C. Thomas. Jan 81, 54p NASA-TM-81919

A guide for DTIZE, a two dimensional digitizing program with graphical editing capability, is presented. DTIZE provides the capability to simultaneously create and display a picture on the display screen. Data descriptions may be permanently saved in three different formats. DTIZE creates the picture graphics in the locator mode, thus inputting one coordinate each time the terminator button is pushed. Graphic input devices (GIN) are also used to select function command menu. These menu commands and the program's interactive prompting sequences provide a complete capability for creating, editing, and permanently recording a graphical picture file. DTIZE is written in FORTRAN IV language for the Tektronix 4081 graphic system utilizing the Plot 80 Distributed Graphics Library (DGL) subroutines. The Tektronix 4953/3954 Graphic Tablet with mouse, pen, or joystick are used as graphics input devices to create picture graphics.

ORNL/TM-7369 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
System Software for the NMFECC CRAY-1 Version of GIFTS 4B.
W. H. Gray, and T. V. Baudry. Jan 81, 126p
Contract W-7405-ENG-26

The Oak Ridge National Laboratory (ORNL) maintains a version of the GIFTS system structural analysis computer programs. Executable modules are supported on two different types of computer hardware, a DECsystem-10 and a CRAY-1. Without external difference to the user, these modules execute equivalently upon both types of hardware. Presented herein are the local software enhancements for the ORNL version of GIFTS for the National Magnetic Fusion Energy Computer Center (NMFECC) CRAY-1 computer as well as a description of the ORNL implementation of the system-dependent portions of the GIFTS software library for the NMFECC CRAY-1. (ERA citation 06:008510)

PB81-151391 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Federal CSS, Inc., IBM 360/370 OS/VS COBOL Release 2.3 PTR 8 Indexed I-O Module.
Technical rept.
21 Jan 81, 10p FCTC/TR-80/08

This FCTC Technical Report for the Indexed I-O Module of the IBM 360/370 OS/VS COBOL Compiler Version 2.3 PTF8 (VP/CSS Version .304) provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Module of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This Technical Report is made up of several sections showing the discrepancies found. A companion report (Validation Summary Report CCVS74-VSR645) provides information regarding the validation of the Compiler at the HIGH-INTERMEDIATE level of Federal Standard COBOL (FIPS PUB 21-1).

PB81-151573 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Wang Laboratories, Inc., Wang VS COBOL 3.2.0.
Validation summary rept.
21 Jan 81, 40p CCVS74-VSR705

The Validation Summary Report (VSR) for the Wang Laboratories, Inc., VS COBOL Compiler Version 3.2.0 (O.S. Version 4.2.12) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the LOW level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-151581 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.

Wang Laboratories, Inc., Wang VS COBOL 3.2.0 Indexed I-O Module, Level 1.
Technical rept.
21 Jan 81, 10p FCTC/TR-80/11

This FCTC Technical Report for the Indexed I-O Module of the Wang Laboratories, Inc., VS COBOL Compiler Version 3.2.0 (O.S. Version 4.2.12) provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Module of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This Technical Report is made up of several sections showing the discrepancies found. A companion report (Validation Summary Report CCVS74-VSR705) provides information regarding the validation of the Compiler at the LOW level of Federal Standard COBOL (FIPS PUB 21-1).

PB81-151714 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Harris Corporation Harris COBOL74 Version 9.0.0.
Validation summary rept.
2 Feb 81, 48p CCVS74-VSR670

The Validation Summary Report (VSR) for the Harris Corporation H800 Cobol Compiler Version 9.0.0 (Vulcan Version 08A) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 Cobol Standard (X3.23-1974/FIPS PUB 21-1). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-151722 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Honeywell Information Systems COBOL CP-6 (A02) - DPS/C.
Validation summary rept.
2 Dec 81, 70p CCVS74-VSR652

The Validation Summary Report (VSR) for the Honeywell DPS/C COBOL Compiler Version A02 (A01 Operating System) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the HIGH level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-155582 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Sperry UNIVAC OS/3 COBOL - Version 7.0.
Validation summary rept.
28 Jan 81, 70p CCVS74-VSR755

The Validation Summary Report (VSR) for the Sperry Univac 90/40 OS/3 COBOL Compiler Version 7.0 (OS/3 Version 7.0) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the HIGH level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-155590 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Honeywell Information Systems Level 66/DPS - GCOS COBOL CB4.0.
Validation summary rept.
21 Jan 81, 66p CCVS74-VSR650

The Validation Summary Report (VSR) for the Honeywell Information Systems Level 66/DPS COBOL Compiler Version CB4.0 (SR 4JS2 Version DPS1.2-GCO) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the HIGH level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-155608 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Burroughs Corporation Small Systems COBOL 74 - Release 10.0.
Validation summary rept.
2 Feb 81, 65p CCVS74-VSR696

The Validation Summary Report (VSR) for the Burroughs B1855 COBOL Compiler Version 10.0 (MCPII Version X.0) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the HIGH level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-155921 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Honeywell Information Systems Level 68/DPS - Multics COBOL Version 4.4.
Validation summary rept.
21 Jan 81, 66p CCVS74-VSR651

The Validation Summary Report (VSR) for the Honeywell Information Systems Level 68/DPS COBOL Compiler Version 4.4 (MR8.0 MULTICS Version) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the HIGH level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-155939 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Harris Corporation FORTRAN77 Version 9.0.0.
Validation summary rept.
2 Feb 81, 8p FCVS78-VSR671

The Validation Summary Report (VSR) for the Harris Corporation H800 Fortran 77 Compiler Version 9.0.0 (Vulcan Version 08A) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 Fortran Standard (X3.9-1978). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies; a section relating the categories of discrepancies to the language; and a detailed listing of discrepancies together with the tests which were failed.

PB81-155947 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Harris Corporation, Harris COBOL74 Version 9.0.0 Indexed I-O Module.
Technical rept.
2 Feb 81, 12p FCTC/TR-80/09

The FCTC Technical Report for the Indexed I-O Module of the Harris Corp., H800 Cobol Compiler Version 9.0.0 (Vulcan Version 08A) provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Module of the 1974 Cobol Standard (X3.23-1974/FIPS PUB 21-1). This Technical Report is made up of several sections showing the discrepancies found. A companion report (Validation Summary Report CCVS74-VSR670) provides information regarding the validation of the Compiler at the Low-intermediate level of Federal Standard Cobol (FIPS PUB 21-1).

PB81-159337
(Order as PB81-159196, PC **A07**/MF **A01**)
Fourth Ministry of Machine Building, Beijing (China).
Ultrahigh Speed Hardware Algorithm for Radix Two Multi-Digit Addition and Its Potential Applications,
Luo Peilin, and Wang Gongben. 27 Jan 80, 9p
Included in Scientia Sinica, v23 n10 p1348-1356 Oct 80.

Starting from the postulate for radix two multi-digit addition by means of direct logic decision, the authors have derived several ultrahigh logic speed structures of multi-digit adders through rather simple procedures. One of the schemes represents the upper limit of the logic speed, i.e., two logic levels. While this scheme has principally theoretical significance, other schemes potentially applicable to the present state of technology have also been worked out. These schemes have logic speeds of three and four logic levels. They adapt themselves up to 16 and 64 digits respectively. Some key points of engineering significance have been investigated, resulting in certain kinds of optimization.

PB81-803934 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Symbolic Programming. 1964-February, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Feb 81.
Feb 81, 114p
Supersedes PB80-804198, and NTIS/PS-79/0082.

Studies on symbolic computation of finite difference equations, symbolic algebraic manipulation, interactive symbolic manipulation, and algorithms for accessing symbolic tables are presented. (This updated bibliography contains 104 citations, 27 of which are new entries to the previous edition.)

PB81-804114 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Optical Memories. 1964-January, 1981 (Citations from the NTIS Data Base).
Rept. for 1964-Jan 81.
Feb 81, 171p
Supersedes PB80-804453, and NTIS/PS-79/0074.

Research is cited on efforts towards the development of optical memories for data storage. Performance and applications studies of optical storage devices are also cited, including holographic storage. (This updated bibliography contains 164 citations, 15 of which are new entries to the previous edition.)

PB81-859068 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Magnetic Bubbles. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Feb 81, 59p NERACSPNNT3108

This retrospective bibliography contains citations concerning the design, development, fabrication, and some applications of magnetic bubble memory devices. Attention is given also to the patterns, properties, and behavior of magnetic bubble materials under various conditions. Particular emphasis is placed upon dynamic structural changes of bubble walls. (Contains 49 citations, fully indexed and including a table of contents.)

SAND-80-2367J PC **A04**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Implementation of Rosenbrock Methods.
L. F. Shampine. Nov 80, 52p

Contract AC04-76DP00789

Rosenbrock formulas have shown promise in research codes for the solution of initial-value problems for stiff systems of ordinary differential equations (ODEs). To help assess their practical value, the author wrote an item of mathematical software based on such a formula. This required a variety of algorithmic and software developments. Those of general interest are reported in this paper. Among them is a way to select automatically, at every step, an explicit Runge-Kutta formula or a Rosenbrock formula according to the stiffness of the problem. Solving linear systems is important to methods for stiff ODEs, and is rather special for Rosenbrock methods. A cheap, effective estimate of the condition of the linear systems is derived. Some numerical results are presented to illustrate the developments. (ERA citation 06:008512)

SAND-80-8038 PC **A02**/MF **A01**
Sandia National Labs., Livermore, CA.
Computerized ART Plotting System. II. Two-Dimensional Graphs.
H. Yano, and R. H. Tucker. Nov 80, 20p
Contract AC04-76DP00789

Computers have been able to create graphs for many years, but their aesthetics have generally been ignored. As a result, although computer-generated graphs have been used extensively in test reports and other data-oriented publications, authors have had to turn to technical illustrators for a product suitable for formal presentation. The program described in this report was specifically designed to fill this gap. Entering format information and data on a Tektronix 4014 terminal, the user can create, correct, and store two-dimensional graphs with up to nine curves on rectangular, semilog, and log-log coordinates. Hard copies can be obtained in the form of prints from a Tektronix 4631 or 35-mm film from the computer. From the film, high-quality prints, slides, and projection transparencies can be made. 3 figures. (ERA citation 06:008513)

UCID-18220 PC **E03**/MF **$4.30**
California Univ., Livermore. Lawrence Livermore Lab.
SOC Code: Lagrangian, Finite-Difference Calculational Technique in One-Dimensional Symmetry.
C. M. Snell, and M. G. Austin. 23 Jul 79, 36p
Contract W-7405-ENG-48
Includes 10 sheets of 48 reduction microfiche.

A brief description and complete listings of the SOC finite-difference computer code and its related family of codes are given. (ERA citation 06:006665)

UCID-18872(V.1) MF **A01**
Lawrence Livermore National Lab., CA.
Software Overview Manual.
R. Allen. Nov 80, 16p
Contract W-7405-ENG-48
Available in microfiche only.

This is a software overview manual for several software packages developed as part of the COMSYS computer teleconference system, an LSI-11 based communications system. The packages were intended to be general-purpose software, for use in other LSI-11 based systems besides COMSYS. This manual was written for a programer who might wish to use some or all of this software in developing such systems. Word-processing, small to medium data-base storage and query systems, microcomputer networks, and text exiting systems are examples of systems that might exploit this software. Each package is briefly discussed, and then how they may be used together in an LSI-11 based system is examined. The reader is assumed to be an experienced programer who is familiar with the LSI-11 computer and the RT-11 operating system. All of the packages were written in assembly language, and all of the user-interfaces are callable from Pascal programs. The packages are SADI (Serial Asynchronous Device Interface), FILLIB (File Library), QMSLIB (Queue Management System Library), UTLLIB (Utility Library, and ASNLIB (Asynchronous Library). There is a separate User's Guide for each of these 5 packages, which describes in detail the procedures and functions each provides. (ERA citation 06:008519)

UCID-18872(V.5) PC **A04**/MF **A01**
Lawrence Livermore National Lab., CA.
QMSLIB User's Guide.
R. Allen. Jul 80, 59p
Contract W-7405-ENG-48

The Queue Management System library (QMSLIB) package is a set of procedures and functions, compatible with RT-11 Version 3B (FB and SJ monitors) programs written in OMSI Pascal. This software allows a user program to perform various manipulations on queue data structures that are particularly useful in interactive and/or multi-tasking applications. In addition to queue data structures, the package includes facilities for operating on linked list data structures. The package comprises a library object file and a text file of declarations. An overview of the library is given and the various capabilities it includes are explained; then, each routine in the package is described in detail. (ERA citation 06:008523)

UCID-18872(V.6) PC **A04**/MF **A01**
Lawrence Livermore National Lab., CA.
FILLIB User's Guide.
R. Allen. Jul 80, 67p
Contract W-7405-ENG-48

In many interactive applications, it is necessary to read and write disk files asynchronously. A special library was developed to aid in processing files when this kind of asynchronous processing is needed. The library provides asynchronous operations on disk files. The library is written entirely in assembly language, and requires fewer than 1500 words (decimal) of memory. The package is compatible with RT-11 Version 3B, both the SJ and FB monitors. The package and how to use it are described, including input and output files, Asynchronous Random Access Files, and the Record Bank data structure. (ERA citation 06:008524)

UCRL-52999 PC **A03**/MF **A01**
Lawrence Livermore National Lab., CA.
Craynet Simulation.
W. B. Watson. 8 Sep 80, 35p
Contract W-7405-ENG-48

The Craynet, a local network configuration at the Lawrence Livermore National Laboratory, was studied using a discrete event simulation technique. This report describes the Craynet configuration, quantifies the current and expected average and instantaneous loads to the limits of available information, and specifies the simulated performance of this configuration when it is subjected to these loads. 15 figures, 1 table. (ERA citation 06:008514)

9C. Electrical and Electronic Engineering

AD-A094 731/7 PC **A05**/MF **A01**
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
Advanced Techniques for Black Box Modeling (Effect of Signal Quantization; Multirate Sampling of Wideband Systems).
Final technical rept. 1 Oct 78-31 Aug 79,
V. K. Jain. Nov 80, 95p RADC-TR-80-343
Contract F30602-78-C-0120
Prepared in cooperation with University of South Florida, Tampa. Dept of Electrical Engineering. Rept. no. SS-28QZ.

The pencil-of-function method is a black box modeling method. The research described here deals with the issues of (1) effect of quantized input output signals and (2) the modeling of wideband systems. The development shows that the pencil-of-functions method together with certain statistical corrections and/or the use of multirate sampling lead to enhanced transfer function models. Also, it is shown that LF, MF and HF test results, when employed in conjunction with procedure described for adjoining smallband transfer functions, yield successful wideband identification. (Author)

N81-16388/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
High Temperature Electronic Requirements in Aeropropulsion Systems.
W. C. Nieberding, and J. A. Powell. 1981, 5p
NASA-TM-81682, E-708
Proposed for Presentation at High-Temp. Electron. Conf., Tucson, Ariz., 25-27 Mar. 1981; Sponsored by NASA, Doe and IEEE.

This paper discusses the needs for high temperature electronic and electrooptic devices as they would be used on aircraft engines in either research and development applications, or operational applications. The conclusion reached is that the temperature at which the devices must be able to function is in the neighborhood of 500 to 600 C either for research and development or for operational applications. In research and development applications, the devices must function in this temperature range when in the engine but only for a moderate period of time. On an operational engine, the reliability requirements dictate that the devices be able to be burned-in at temperatures significantly higher than those at which they will function on the engine. The major point made is that semiconductor technology must be pushed well beyond the level at which silicon will be able to function.

N81-16533/4 PC **A16**/MF **A01**
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
Solar Power Satellite Microwave Transmission and Reception.
R. H. Dietz. Dec 80, 271p NASA-CP-2141, S-503
Workshop Held in Houston, Tex., 15-18 Jan. 1980.

No abstract available.

PB81-156606 PC **A04**/MF **A01**
National Bureau of Standards, Boulder, CO.
Helium Research in Support of Superconducting Power Transmission.
Annual rept. 1 Oct 78-30 Sep 79,
D. E. Daney. Dec 80, 59p NBSIR-80-1637
Sponsored in part by Brookhaven National Lab., Upton, NY. See also PB80-116502.

The authors have completed the first phase of our investigation of SPTL cool-down in which the aim was to develop a fundamental understanding of the counter-flow method of cool-down. The excellent agreement of our analytical, numerical, and experimental results gives us confidence that we can accurately model the cool-down of full scale SPTL's. The cable permeability measurements indicate that any significant rupture of the lead gas barrier of the cable will lead to an unacceptably high leak rate from the pressurized core.

PB81-854648 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Electric Codes and Standards. July, 1970-November, 1980 (Citations from the NTIS Data Base).
Rept. for Jul 70-Nov 80.
Dec 80, 77p NERACUSGNT2457

This bibliography presents electrical safety requirements in various nations. The electric codes covered apply to office equipment, office lighting, medical equipment, laboratory equipment, food processing equipment, data communications equipment, household appliances and building wiring. The countries surveyed include Germany, Spain, Sweden, Switzerland, France, Great Britain and the United States. (Contains 67 citations, fully indexed and including a table of contents.)

PB81-854655 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Electric Codes and Standards. April, 1970-November, 1980 (Citations from the Engineering Index Data Base).
Rept. for Apr 70-Nov 80.
Dec 80, 96p NERACEI NT2457

This bibliography cites reports relating to codes and standards in various industries and some residential building wiring. There are a few review articles, assessing standards or methodology and means to attain the standards. Subject areas include motors, grounding, shielding, fusing, transformer ratings, and switchgear. (Contains 105 cita-

tions, fully indexed and including a table of contents.)

PB81-857898 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Servomotors. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Dec 80, 109p NERACIAANT2380

This bibliography contains worldwide information on ac, dc and brushless servomotors applied to hydraulic presses, teleprinters, microprocessors, machine tools, sewing machines and control devices. Reduction of vibration torque and minimum power consumption in servo-mechanism are also considered. (Contains 110 citations, fully indexed and including a table of contents.)

9D. Information Theory

AD-A094 865/3 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
Iterative Procedures for Signal Reconstruction from Phase,
Alan V. Oppenheim, Monson H. Hayes, and Jae S. Lim. 1980, 12p
Contracts N00014-75-C-0951, F19628-80-C-0022
Pub. in SPIE, v231, International Optical Computing Conference, p121-129 1980.

No abstract available.

AD-A095 099/8 PC **A02**/MF **A01**
Colorado State Univ., Fort Collins. Dept. of Electrical Engineering.
Modal Decomposition of Covariance Sequences for Parametric Spectrum Analysis.
Technical rept.,
Louis L. Scharf, A. A. Louis Beex, and Timothy von Reyn. Mar 81, 10p Rept no. TR-37
Contracts N00014-75-C-0518, DAAG29-78-C-0176

In this paper we make the point that a wide variety of spectrum types admit to modal analysis wherein the modes are characterized by amplitudes, frequencies, and damping factors. The associated modal decomposition is appropriate for both continuous and discrete components of the spectrum. The domain of attraction for the decomposition includes ARMA sequences, harmonically- or non-harmonically-related sinusoids, damped sinusoids, white noise, and linear combinations of these. Numerical results are presented to illustrate the identification of mode parameters and corresponding spectra from finite records of perfect and estimated covariance sequences. The results for sinusoids and sinusoids in white noise are interpreted in terms of in phase and quadrature effects attributable to the finite record length. (Author)

9E. Subsystems

AD-A094 729/1 PC **A04**/MF **A01**
Texas Instruments, Inc., Dallas. Semiconductor Group.
Design of a Low Power Schottky TTL High-Speed Digital Phase-Locked Loop Integrated Circuit.
Final rept. 1 Apr 77-30 Jun 80,
James D. Gallia. Oct 80, 54p TI-03-80-30, AFWAL-TR-80-1152
Contract F33615-77-C-1047

A high speed digital phase-locked loop (DPLL) integrated circuit was successfully designed and implemented with Low Power Schottky technology. The Avionics Laboratory sponsored the development of the SN54LS297 DPLL IC, which was designed to become a standard Texas Instruments catalog part. This device uses strictly digital techniques to perform the first order phase-locked loop linear function and can be cascaded to form higher order phase filters. The center frequency and bandwidth are digitally programmable, and Q's of 8 to 130,000 can be obtained, making possible narrow-bandwidth phase tracking with higher resolution than conventional phase-locked loops. (Author)

AD-A095 045/1 PC **A17**/MF **A01**
General Dynamics/Pomona, CA. Pomona Div.
Rigid-Flex Printed Circuit Manufacturing process. A Project of the Manufacturing Technology Program.
Final rept. Oct 77-May 79,
Joseph A. Reavill. 30 Jun 79, 386p NAVSEA-MT-S-479-77, NOSC-TR-531
Contract N00123-77-C-1192
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

The activities performed to achieve the program objectives first involved identifying one of eight different suppliers in order to purchase the polyimide glass laminate. The laminate supplier selection was based upon material testing, cost, quality/technology level, and production capability. Material was procured and a process investigation was conducted which evaluated current production processes by fabricating and testing sample rigid-flex units. An optimized fabrication process was developed by varying individual process parameters and the deliverable rigid-flex units were fabricated according to the documented material, process, and product specifications generated during this program. To establish that the cables meet specification requirements, extensive testing was performed on each unit. A yield/cost analysis was performed to verify the achievement of program goals.

AD-A095 093/1 PC **A02**/MF **A01**
Armed Forces Radiobiology Research Inst., Bethesda, MD.
Evaluation of Elliptical Focusing Dish Antenna for High-Power Density Microwave Irradiation,
S. A. Oliva, G. M. Oosta, and N. S. Mathewson. Sep 77, 13p Rept no. AFRRI-TN77-3

The operating characteristics of the Elliptical Focusing Dish Antenna, located in the Department of Microwave Research, Walter Reed Army Institute of Research, were measured to confirm its suitability for use in delivering high-power density microwave exposure to a small region on a test animal. A detailed field map confirms the location of the second focus of the antenna to within 0.5 cm. Measured absolute power density was found to agree with the original specifications to within + or - 1.8 dB. (Author)

PAT-APPL-6-083 484 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Light Modulated Electron Beam Driven Radio-frequency Emitter.
Patent Application,
M. T. Wilson, and P. J. Tallerico. Filed 10 Oct 79, 12p
Contract W-7405-ENG-36
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The disclosure relates to a light modulated electron beam-driven radiofrequency emitter. Pulses of light impinge on a photoemissive device which generates an electron beam having the pulse characteristics of the light. The electron beam is accelerated through a radiofrequency resonator which produces radiofrequency emission in accordance with the electron, hence, the light pulses. (ERA citation 06:005184)

PAT-APPL-6-101 339 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Ac Resonant Charger with Charge Rate Unrelated to Preimary Power Requency.
Patent Application,
Filed 7 Dec 79, 12p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An ac resonant charger for a capacitive load, such as a pulse forming network (PFN), is provided with a variable repetition rate unrelated to the frequency of a multi-phase ac power source by using a control unit to select and couple the phase of the power source to the resonant charger in order to charge the capacitive load with a phase that is the next to begin a half cycle. For optimum range in repetition rate and increased charging voltage, the resonant charger includes a step-up transformer and full-wave rectifier. The next phase selected may then be of either polarity, but is always selected to be of a polarity opposite the polarity of the last phase selected so that the transformer core does not saturate. Thyristors are used to select and couple the correct phase just after its zero crossover in response to a sharp pulse generated by a zero-crossover detector. The thyristor that is turned on then automatically turns off after a full half cycle of its associated phase input. A full-wave rectifier couples the secondary winding of the transformer to the load so that the load capacitance is always charged with the same polarity. (ERA citation 06:005182)

PAT-APPL-6-101 365 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Energy Absorption Circuit Using a Triggered Spark GAP.
Patent Application,
Filed 11 Dec 79, 7p
Contract EY-77-C-04-3745
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An energy absorption circuit for fault protection of a load pulsed by an LC-type pulse forming network (PFN) is connected at one end of the PFN opposite from the load. The circuit is comprised of a triggerable spark gap (TSG) switch and a discharge resistor connected in series across the one end of the PFN. A capacitive voltage dividing circuit and a voltage dropping resistor in series are also connected across the one end of the PFN. An intermediate voltage junction of the capacitive voltage dividing circuit is connected to the trigger electrode of the TSG switch to trigger the switch on when a reverse voltage wavefront reflected from a faulty load appears across the dropping resistor to add to the voltage of the capacitive voltage divider, thereby to arc one gap in the switch, whereupon arcing in the other gap ensues. (ERA citation 06:005181)

PAT-APPL-6-101 369 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Waveform Synthesizer.
Patent Application,
L. A. Franks, and M. A. Nelson. Filed 7 Dec 79, 10p
Contract EY-76-C-08-1183
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention is a method by which an optical pulse of an arbitrary but defined shape may be transformed into a virtual multitude of optical or electrical output pulse shapes. Since the method is not limited to any particular input pulse shape, the output pulse shapes that can be generated thereby are virtually unlimited. Moreover, output pulse widths as narrow as about 0.1 nsec can be readily obtained since optical pulses of less than a few picoseconds are available for use as driving pulses. The range of output pulse widths obtainable is very large, the limiting factors being the driving source energy and the particular shape of the desired output pulse. (ERA citation 06:005183)

PB81-179582 PC**$8.50**/MF **A01**
Patent and Trademark Office, Washington, DC. Office of Technology Assessment and Forecast.
Patent Profiles, Microelectronics - I.
Feb 81, 262p

This report was designed to offer users, both technically and non-technically oriented, insight into the 'who, what, when and where' of the U.S. patent activity in microelectronics and, perhaps, an indication of the direction the technology is headed. The objective of the publication is to increase the awareness and use of the U.S. patent file as a prime technological information resource, so that the file may contribute more fully to the knowledge from which future inventors and innovators draw, and upon which corporate and public policy plan-

ners rely. This publication is directed to two major areas of microelectronics. The first relates to specific integrated circuit structure. The second relates to systems in which the inventive thrust involves the use of a microelectronic information processing device, for example, a central processing unit. The report attempts to 'snapshot' the patent activity in selected portions of the patent file which relate to these important segments of microelectronics technology development. For each of the noted major areas of microelectronics, the report (1) graphically illustrates patent activity (across a designated 10-year span) by the patent grant date and by the granted patents' application filing date; (2) shows in tabular form the date relied upon in constructing the graphical illustrations; (3) provides a list of assignees in the subject field, ranked by the number of patents to which they held title at the time of the patent grant; (4) lists those assignees alphabetically followed by a numerical listing of their patents with titles. (This section provides valuable information by identifying corporate authors in the field); (5) presents an alphabetical listing of inventors of unassigned patents (1975 to 1979) together with their addresses, the patent numbers and titles; and (6) provides a brief summary and analysis of other patent documents referenced during the examination process for those patents granted in each subject area during 1975-1979. As an updating technique for each of the subject areas, a listing of assignees with two or more patents issued during the time period covered from January to October 1980 is provided (ranked by total patent receipts), followed by copies of first pages of those patents. The two areas covered in this publication encompass but a portion of the highly active field of microelectronics. Consequently, a series of follow-on reports is planned covering such areas as microelectronic memory devices and microelectronic device manufacturing techniques.

PB81-804007 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Hybrid Microelectronic Circuits. 1977-January, 1981 (Citations from the NTIS Data Base).
Rept. for 1977-Jan 81.
Feb 81, 167p
Supersedes PB80-805922, and NTIS/PS-79/0210. See also 1964-1976, NTIS/PS-79/0209.

The bibliography presents Federally-sponsored research reports relating to the technology of thick and thin film hybrid microcircuits. Research on the design, materials, processing, fabrication, quality control, reliability, and applications of the circuits is included. (This updated bibliography contains 160 citations, 29 of which are new entries to the previous edition.)

PB81-804015 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Hybrid Microelectronic Circuits. 1978-January, 1981 (Citations from the Engineering Index Data Base).
Rept. for 1978-Jan 81.
Feb 81, 338p
Supersedes PB80-805930, and NTIS/PS-79/0212. See also 1973-1974, NTIS/PS-77-0021 and 1975-1977, NTIS/PS-79/0211.

Research reports from worldwide literature relating to the technology of thick and thin film hybrid microcircuits are cited. Research on the design, materials, processing, fabrication, quality control, reliability, and applications of the circuits is included. (This updated bibliography contains 331 citations, 62 of which are new entries to the previous edition.)

PB81-859092 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
MOS Circuit Design and Applications. January, 1970-December, 1980 (Citations from the NTIS Data Base).
Rept. for Jan 70-Dec 80.
Feb 81, 219p NERACUSGNT3197

This retrospective bibliography contains citations concerning metal oxide semiconductor (MOS) circuit design, theory, practice, and MOS circuit applications. MOS integrated circuit (IC) devices and MOS large scale integrated circuit (LSI) devices are considered from the points of view of design, fabrication, and reliability. Some key applications are in minicomputers, microprocessors, dynamic amplifiers, frequency multipliers, and ladder filters. (Contains 220 citations, fully indexed and including a table of contents.)

PB81-859100 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
MOS Circuit Design and Applications. January, 1970-December, 1980 (Citations from the Engineering Index Data Base).
Rept. for Jan 70-Dec 80.
Feb 81, 227p NERACEI NT3197

This retrospective bibliography contains citations concerning metal oxide semiconductor (MOS) circuit design, theory, practice, and MOS circuit applications. MOS integrated circuit (IC) devices and MOS large scale integrated circuit (LSI) devices are considered from the points of view of design, fabrication, and reliability. Some key applications are in minicomputers, microprocessors, dynamic amplifiers, frequency multipliers, and ladder filters. (Contains 261 citations, fully indexed and including a table of contents.)

PB81-859415 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Plasma Display Panels. January, 1970-December, 1980 (Citations from the NTIS Data Base).
Rept. for Jan 70-Dec 80.
Feb 81, 57p NERACUSGNT3057

This retrospective bibliography contains citations concerning the design, development, and performance of various types of plasma display panels. Interactive techniques and utilization of plasma display systems in a wide variety of applications ranging from large area displays to aircraft cockpit displays are included. (Contains 49 citations, fully indexed and including a table of contents.)

9F. Telemetry

ONWI-35 PC **A11**/MF **A01**
IRT Corp., San Diego, CA.
Borehole Plugging Telemetry System. Technical Report.
Oct 79, 247p
Contract AC06-76RL01830

This report summarizes the development of a through-the-earth electromagnetic communication system which was designed to demonstrate that a physical property could be measured deep in the earth and the data received at the surface by wireless telemetry. This system was configured to be placed in a borehole and sealed in place thus preventing the establishment of a pathway between a deep geologic nuclear waste repository and the biosphere. This report contains a detailed description of the downhole and wellhead telemetry electronics, the downhole sensor electronics, integrated system operation, test results, conclusions, and recommendations. (ERA citation 06:007012)

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

AD-A094 988/3 PC **A03**/MF **A01**
Aeronautical Research Labs., Melbourne (Australia).
Wind Energy - How Reliable.
Structures rept.,
Douglas J. Sherman. Jan 80, 36p Rept no. ARL/STRUC-380

The reliability of a wind energy system depends on the size of the propeller and the size of the back-up energy storage. Design of the optimum system for a given reliability level can be performed if a time series of wind speed data is available. However, a design based on conventional meteorological records, which sample the wind speed with a ten minute averaging time at three-hourly intervals, will over-estimate the storage by a factor of approximately 2, and if the wind speed is only available on a daily basis the storage will be over-estimated by a factor of 2.5 to 4.0. This is because a propeller can respond to wind speed changes in much less than ten minutes and also because three-hourly sampling does not often pick up the brief high-speed incidents which generate a significant part of the wind energy. A nomogram is presented, based on some continuous wind speed measurements, which enables storages calculated from three-hourly or daily data to be appropriately reduced because of these two effects. (Author)

AD-A095 051/9 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
The Outlook for Conventional Petroleum Resources.
Richard Nehring. Nov 79, 25p Rept no. RAND/P-6413

This paper addresses the prospects for conventionally produced petroleum. This includes crude oil, natural gas liquids, and natural gas produced from accumulations where some commercial production can occur without injection or fracturing. It excludes petroleum liquids produced from tar sands, oil shale, coal, and biomass. It excludes natural gas produced from coal, shales, tight (microdarcy permeability) sandstones, and landfills. In some cases, the dividing line between the conventional and nonconventional is fuzzy, for example, between conventionally produced heavy crude oil and some tar sands or between natural gas production from low and very low permeability sandstones. These, however, are rare enough to make the distinction a workable one in practice.

CISE-1606 PC **A03**/MF **A01**
Centro Informazioni Studi Esperienze, Milan (Italy).
Optimized Design of Total Energy Sytems: The RETE Project.
P. Alia, F. Dallavalle, C. de Nard, F. Sanson, and S. Veneziani. 1980, 40p CONF-8005120-1
International conference of urban heating, Sirmione, Italy, 12 May 1980.

The Total Energy Systems can be defined, at a conceptual level, as systems meeting the energy requirements of a user by maximizing the utilization of primary energy sources (with reference to their thermal-dynamic quality) and, as a consequence, by minimizing the consumption of nonrenewable energy sources. The RETE (Reggio Emilia Total Energy) project has been conceived as a demonstration plant of the TES concept. The study was developed at CISE to: achieve the maximum quality matching on the thermal energy side, between plant and user and perform an open scheme on the electrical-energy side by connection with the Italian electrical network. The most-significant qualitative considerations at the basis of the plant economic-energy optimization and the selection of the operating criterion mostly fitting the user-consumption characteristics and the external system constraints are reported. The design methodology described results in a TES that: in energy terms achieves a total efficiency evaluated on a yearly basis to be equal to about 78% and a fuel saving of about 28% and in economic terms allows a recov-

ery of the investment required as to conventional solutions, in about 7 years. (ERA citation 06:004929)

CONF-7905109- PC **A14**/MF **A01**
Iowa State Univ., Ames.
Wind Energy Applications in Agriculture.
H. H. Kluter, and L. H. Soderholm. 1979, 325p
Wind energy application in agriculture conference, Ames, IA, USA, 15 May 1979.

Separate abstract are included for each of the papers presented concerning the use of wind turbines in agriculture. (ERA citation 06:007650)

CONF-801030-4 PC **A02**/MF **A01**
Department of Energy, Bartlesville, OK. Bartlesville Energy Technology Center.
Fleet Trials Using Methanol/Gasoline Blends.
K. R. Stamper. 1980, 10p
International symposium on alcohol fuels technology, Sao Paulo, Brazil, 5 Oct 1980.

Seven current-production automobiles were used in a fleet study to determine the long-term effects and end-use influences of using 10% methanol/90% gasoline blends as automotive fuels. The vehicles were operated over a course designed to accumulate mileage at a rate and duty cycle similar to automobiles used by the private sector in the US. Vehicle tests were run at each 5000-mile accumulation interval to determine the fuel economy and the mass of pollutant emissions generated by the vehicles operating on the 10% methanol blend and to establish a basis for comparison on an unleaded, low-octane Indolene. These data showed an average reduction in volumetric fuel economy (approximately 5%) and a consistent reduction in carbon monoxide emissions associated with the use of the 10% methanol blend. At the end of 50,000 miles of operation on the blend, the engine and fuel handling systems in four of the vehicles were disassembled for inspection and rating to identify any significant wear or materials incompatibility problems associated with long-term operation on the methanol blend. Crankcase lubricants were changed at 5000-mile intervals. Subsequent analyses of the used lubricants did not reveal any significant abnormalities that would indicate an adverse fuel/lubricant interaction. Two of the vehicles were used in Sealed Housing for Evaporative Determination tests using low-octane Indolene and a 10% methanol/90% Indolene blend. The data from these tests showed a significant increase in evaporative emissions associated with short-term use of the methanol blends and an even greater increase when the methanol blend is used for extended periods. (ERA citation 06:007896)

COO-4528-T1(V.1) PC **A07**/MF **A01**
Urban Systems Research and Engineering, Inc., Cambridge, MA.
Preparation and Development of Land Use Energy Consumption Data Sets. Volume 1, Phase 1. Final Report.
20 Dec 78, 138p
Contract EC-77-C-02-4528

An analysis was made of the potential usefulness of land-use-related data, the availability of relevant information in the literature, and potential approaches for data collection. This volume describes the results of the analysis, while Volume II contains technical backup materials. Chapter 2 discusses the issue of community classification: questions of classification and aggregation have been the most significant technical issues faced on the project, since they strongly affect the accuracy and usefulness of any data that are developed. Chapter 3 is concerned with consistency of accounting, primarily in the measurement of energy use. Transportation patterns, energy-transmission losses, and energy embodied in materials and structure can all be assigned to various land uses in a number of ways, and it is important to perform the assignment in a way that is valuable for the policies being evaluated. Thus, Chapter 3 forms the structure for the dependent variables of the system: the various types and patterns of energy use, while Chapter 2 describes the structure of the independent variables, which are the land-use patterns described, plus other factors such as climate. Chapter 4 takes these two structures and presents computations of energy use for the various patterns of land uses, based on the literature, and Chapter 5 discusses the implications of these analyses for energy planning. This leads directly to Chapter 6, where recommendations are made regarding both data collection and use of existing data. (ERA citation 05:003205)

DOE/AL/04266-T1 PC **A05**/MF **A01**
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Metallurgical and Materials Engineering.
Microstructural and Mechanical Property Evaluation of Black Chrome and Zinc Oxide Coated Solar Collectors. Annual Report No. II, June 1979-March 1980.
O. T. Inal. 1980, 85p
Contract AS04-78AL04266

Plating parameters for black-chrome system were optimized with respect to selectivity utilizing simplex evolutionary operation procedures in sixteen sets of experiments. Overgrowths produced with the optimized parameters were then evaluated for optical, structural, thermal stability and mechanical properties. It is observed that the coatings produced possess consistently high selectivity values (approx. 10), are durable against exposure to high temperature ($>$ 400 exp 0 C in air and $>$ 500 exp 0 C in neutral atmosphere), are well attached to their structure ($>$ 340 kg/cm exp 2), and are quite ductile (bent to 131.5 exp 0 previous to fracture) and reasonably remain so following exposure to 500 exp 0 C (2 hrs) in air (84.2% bend previous to fracture). Black zinc oxide surfaces created on leaf zinc, electroplated zinc on steel, and hot-dip zinc coated steel substrates show selectivity values that vary between 6-9, are seen to maintain their physical integrity as well as optical properties following exposure to 250 exp 0 C (2 hrs) in air, possess high strength of attachment to their substrates ($>$ 285 kg/cm exp 2), and are quite ductile (170 exp 0 bend previous to fracture) and maintain a reasonably high ductility (121 exp 0 bend previous to fracture) following exposure to 250 exp 0 C (2 hrs) in air. Structural analysis of both overgrowths show them to consist of oxide particles within which elemental component of the oxide is seen to be distributed in the unassociated form. The plating parameters utilized in deposition of the coatings are seen to alter quantity and distribution of the elemental component and effect optical properties of these surfaces. These composite particles are seen to be of various sizes but the distribution of these particles are seen to be constant throughout the overgrowth. (ERA citation 06:007500)

DOE/CS/20167-02 PC **A06**/MF **A01**
National Center for Resource Recovery, Inc., Washington, DC.
Use of RDF to Dry Recovered Froth-Floated Glass. Final Report.
Oct 80, 122p
Contract AC01-76CS20167

An evaluation is made of the technical and economic feasibility of using waste- or refuse-derived fuel, at a resource recovery site, to provide the energy for drying glass recovered by froth flotation. A survey of equipment manufacturers and a technical study of an assembly, including a waste combusting unit, heat exchanger, and dryer is conducted. An equipment package is defined and costed. The analysis shows that, at the present price of oil, and probably for the next decade, drying froth-floated glass is done more economically, simply, and compactly with fuel oil than with refuse-derived fuel in a single-use, dedicated combustor. (ERA citation 06:007906)

DOE/CS/20167-04 PC **A07**/MF **A01**
National Center for Resource Recovery, Inc., Washington, DC.
Use of RDF as a Kiln Fuel. Final Report.
Oct 80, 136p
Contract AC01-76CS20167

Refuse derived fuel (RDF) has been experimented with and/or proposed for use in kilns for the production of portland cement, lime, and expanded shale (a form of lightweight aggregate). Technological issues affecting the use of RDF in kilns are reviewed as are the results of trials in which RDF has been used as a kiln fuel. Three future research/demonstration projects for addressing the major unresolved issues are discussed. These projects are: a lime plant trial; a trial in a pre-calcining furnace; and an extended trial in a cement kiln. (ERA citation 06:007907)

DOE/CS/23999-T1 PC **A03**/MF **A01**
NAHB Research Foundation, Inc., Rockville, MD.
Appliance Energy Efficiency in New Home Construction. Final Report.
30 Nov 80, 31p
Contract AC01-80CS23999

A survey of 224 builders was conducted to which 160 builders responded. Each respondent completed between one and seven separate questionnaires. Each of the seven questionnaires were designed to collect information about one type of equipment or major appliance. These are: heat pump; heating system; air conditioner; domestic water heater; dishwasher; range; and refrigerator. Analysis of the resulting 406 questionnaires indicated that builders were primarily responsible for brand selection. These choices were made primarily without regard for the energy efficiency of the product. A similar apparent lack of consideration of energy efficiency during brand and model selection was found among home buyers and specialized subcontractors. (ERA citation 06:007875)

DOE/CS/34029-T1 PC **A09**/MF **A01**
Russell Sage Foundation, New York.
Impact of Federal Tax Policy and Electric Utility Rate Schedules Upon the Solar Building/Electric Utility Interface. Executive Summary.
S. L. Feldman, R. M. Wirtshafter, M. Abrash, B. Anderson, and P. Sullivan. 1 Oct 78, 190p
Contract FG01-77CS34029

An analysis is performed to show that a utility solar-passive strategy can be used rather effectively in aiding the utility to obtain more efficient load factors and lower costs. The objectives are to determine the impact of active and passive solar energy designs for space conditioning and hot water heating for the residential sector upon the diurnal and annual load curves for several utilities, to assess the effect of present utility pricing policies, and to examine alternative pricing schemes, as well as Federal and state tax credits, as they may affect the optimal sizing and configuration of active solar and passive solar building components. The methodology, the systems model, an overall building design, building cost determination, and a description of TRNSYS are presented. The major parameters discussed that distinguish variation in the cost-effectiveness of particular building design fall into 5 categories: the weather, building configurations, building costs, utility costs and rates, and financial parameters (inclusive of tax credits for solar and energy conservation investment). Five utilities are studied: Colorado Springs Department of Public Utilities; Public Service Co. of New Mexico; New England Electric System; Pacific Gas and Electric; and Georgia Power Co. (ERA citation 06:007123)

DOE/EIA-0041/1Q(78) PC **A03**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
National Trends in Electric Energy Resource Use. Energy Data Reports. First Quarter, 1978.
Nov 78, 44p

National trends in the use of electric energy resources for the production of electric power for the first quarter of 1978 are summarized. The report indicates that electric power generation in the first quarter was 3.1% greater than generation in the first quarter of 1977, and approximately 5.2% greater than that in the fourth quarter of 1977. The information is based on data obtained from four monthly forms retained from the former Federal Power Commission: No. 4 (power production, fuel consumption, and fuel stocks information); No. 5 (electric operating revenues and income); No. 12E-2 (energy capability and peak load data); No. 423 (cost and quality of fuels). The graphs are designed to permit trends to be quickly identified while enabling comparison of the trends with those of the previous year. The graphs contain six units of information: net generation; fuel consumption and stockpiles; fuel deliveries; fuel costs; monthly net energy for load and monthly peak loads by regional reliability councils; sales of electric energy. (ERA citation 05:012040)

DOE/EIA-0173(79)/2 PC **A13**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Annual Report to Congress. Volume 2. Data.
1979, 279p

Data on the total energy picture of the USA for 1979 are presented. Also included are data on international energy resources and movements of petroleum and natural gas. A list of energy equivalents has been provided. Many current and historical features of the energy scene are presented. Energy supply, disposition, production, consumption, and trade are covered. Financial data are included. Subsection titles include: petroleum and natural gas resources, exploration, development, and reserves; petroleum supply and disposition; natural gas supply and disposition; coal supply and disposition; electricity supply and disposition; nuclear power supply and disposition; solar and geothermal energy; and miscellaneous energy indicators (motor vehicle registrations, home heating, etc.). (ERA citation 05:032400)

DOE/EIA-0181/2 PC **A07**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Feasibility of Financing Domestic Energy Development During 1978-1984. Analysis Report AR/EI/79-26.
S. P. Kanhouwa. May 79, 127p

This report is an elaboration and an extension of the Section on Finance presented in Chapter 3 of the 1977 Annual Report to the Congress by the EIA. It introduces the satisfactory financing of energy as yet another factor likely to significantly affect the sensitivity of alternative energy-supply projections shown in the ARC. It assesses whether the growth of private investment demand in energy - as implied by the projections - can be adequately met in the future. Aggregate estimates of energy capital requirements are derived for the period from 1978 to 1984. This is done by taking into account capacity additions and levels of exploration and development activity necessary to attain alternative levels of domestic energy output. The latter are abstracted from Projection Series A (high-supply, high-demand), Projection Series C (mid-supply, mid-demand), and Projection Series E (low-supply, low-demand). These correspond to high, medium, and low capital requirements, respectively. In Section II an historical overview of energy investment is presented for the period 1960-1977. In Section III estimates of the capital requirements necessary to achieve the output levels of Projection Series A, C, and E are developed. In Section IV the feasibility of meeting these requirements in the aggregate is analyzed with reference to alternative states of the economy and associated conditions in domestic capital and financial markets. In Section V microeconomic analysis of three major energy-producing sectors, electric utilities, coal, oil, and gas is presented. (ERA citation 05:033697)

DOE/EIA-0207/2 PC **A06**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Residential Energy Consumption Survey: Characteristics of the Housing Stock and Households.
Feb 80, 109p

Data are provided on general structural features of residential housing units; major appliances used by the household; heating equipment and fuels used for space heating, water heating and cooking; and demographic information about the households. The Energy Information Administration (EIA) compiled the data from the National Interim Energy Consumption Survey (NIECS). The data are presented in two ways: in weighted counts of housing units rounded to the nearest thousand and in weighted column percentages. The sample base for the report is 4081 respondents, a figure which includes all occupied residential housing units sampled in the NIECS during the winter of 1978 to 1979. This is the final version of a report first compiled by EIA in December 1979; further, this report supersedes that preliminary report. The appendices include information on how the survey was conducted, a weather zone map, a copy of the household questionnaire, a generalized sampling of errors, and a glossary. 32 tables. (ERA citation 05:024253)

DOE/EIA-0207/4 PC **A04**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Residential Energy Consumption Survey: Consumption Patterns of Household Vehicles, June to August 1979.
Jun 80, 69p

Survey data for the June, July, and August 1979 Household Transportation Panels for the 48 contiguous states and the District of Columbia are given. The tables include both average and aggregate transportation statistics cross-classified by vehicle characteristics (size, age, fuel typically used), and household characteristics (urban/rural, income, one- versus multi-vehicle, number of drivers, household size). Data on the fuel purchasing situation motorists encountered in these months are also provided. Included in the report are: a summary of findings; a description of how the survey was conducted; a copy of the fuel purchase log, the background questionnaire, and the gas lines questionnaire; an explanation of the relative standard errors for total sample estimates; and a glossary. (ERA citation 06:007897)

DOE/JPL-1060-39 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Criteria for Evaluation of Reflective Surfaces for Parabolic Dish Concentrators.
F. Bouquet. 15 Jul 80, 67p
Contract AI01-77ET20401

A summary of the technology for evaluating reflective surfaces for parabolic solar dishes is presented. Commercial, second-surface glass mirrors are emphasized, but aluminum and metallized polymeric films are also included. Criteria for sealing solar mirrors in order to prevent environmental degradation and criteria for bonding sagged or bent mirrors to substrate materials are described. An overview of the technical areas involved in evaluating small mirror samples, sections, and entire large gores is presented. The objective of this study is to establish a basis for mirror criteria that eventually may become part of inspection and evaluation techniques for three-dimensional parabolic reflective surfaces. Concentrator support structure, optical tracking, gore alignment, and other important ancillary problems are omitted from this study. A glossary and important references concerning optical criteria are included. (ERA citation 06:007502)

DOE/PE-0021 PC **A03**/MF **A01**
Department of Energy, Washington, DC. Office of Policy and Evaluation.
Reducing US Oil Vulnerability: Energy Policy for the 1980'S.
10 Nov 80, 40p

This study assesses current Federal energy policies and programs in light of recent events and in light of what are believed to be the most reliable available projections of the future. Then it outlines additional steps - some unpleasant - that could reduce our vulnerability to an oil import disruption during the next decade. Specifically, the study seeks to answer three questions: (1) as a base case, what levels of US energy consumption, production, and imports might we anticipate for 1985 and 1990 under existing statutes, policies, and programs; (2) considering both our own and our allies' dependence on oil imports, how vulnerable does this leave the United States to foreign supply disruptions; (3) considering the likely effects of government policies and programs which already exist to reduce our vulnerability (through reduction of US oil imports or by any other means), are there additional initiatives that could be undertaken to give us greater protection - especially between now and 1990. (ERA citation 06:004519)

DOE/RG/08683-T1 PC **A06**/MF **A01**
Ohio State Univ. Research Foundation, Columbus.
Utility Regulation and the Legislative Process in Oregon: A Case Study.
Jan 79, 110p
Contract AC01-77RG08683

This case study discusses the strategies employed by the Public Utility Commissioner and the Oregon Department of Energy in the design, passage and implementation of a set of energy conservation bills. Information is included on the development of new legislation for energy conservation and management, on developing public acceptance of such legislation, and the cooperation received from utility companies to affect implementation. The lessons in strategy and tactics and the skillful use of the legislative process to get the package of bills enacted should have immediate value for those about to undertake a similar effort in their state. (ERA citation 06:007844)

DOE/TIC-11302 PC **A11**/MF **A01**
Argonne National Lab., IL.
Directory of Key Foreign Personnel, Solar Commercialization.
Nov 80, 235p
Contract W-31-109-ENG-38

The Directory includes: in-country manufacturing, installations and maintenance, agents/industry representatives, non-profit associations, financial institutions, research and development, key government offices, and diplomatic representation. The main listings are grouped by country. Cross-country activity indexes are given for in-country manufacturing, non-profit associations, US countries, and agents/industry representatives. (ERA citation 06:007110)

GRI-79/0005 PC **A12**/MF **A01**
Winter (Steven) Associates, Inc., New York.
Residential Energy Consumption: Baseline Comparison of Single-Family Detached Homes.
1 Nov 79, 255p

The study delineates the evolutionary impact of the energy crisis on energy-consumption levels in new single-family detached (SFD) housing. The study is divided into three phases: (1) determination of baseline residential energy-consumption levels for homes built immediately prior to the oil embargo (1973); (2) quantification of the change in these consumption levels due to changes in current construction practices; and (3) prediction of future residential consumption levels. A methodology was developed for conducting the study focusing on prototypical SFD housing types. Specific construction characteristics for these types in each of the three time periods were generated from industry data and from surveys of the major housing builders and manufacturers throughout the continental US. A thermal analysis of each of the developed prototypes was performed for each time period. Seven cities representing Climatic Zones were selected as sites for these analyses. Concurrently, a demographic survey identified the population of each housing type in each Climatic Zone for the typical years. These demographic data were then overlaid on the results of the thermal analysis to indicate regional and national trends in new (SFD) energy consumption. The study concludes that the thermal efficiency of new housing across the three time periods addressed has significantly improved and will continue to improve. However, due to demographic shifts and changes in housing preference, the national impact of this improved efficiency has been considerably diluted. (ERA citation 05:016001)

KFK-2869-UF PC **A05**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Lab. fuer Aerosolphysik und Filtertechnik.
Cadastre of Waste Heat in the Upper Rhine Valley.
G. Bartholomaei, and W. Kinzelbach. Apr 80, 95p In German.
U.S. Sales Only.

The cadastre of waste heat provides the distribution in space and time of anthropogeneous waste heat emissions on a 2 x 2 km exp 2 grid. In the case of the Upper Rhine Valley it serves as a basis for the numerical evaluations of climatic changes caused by man. Such a cadastre also allows to analyse the distribution of pollutant emissions and the heat or energy supply, respectively, of the region. In a close approximation the distribution of waste heat is equal to the distribution of energy consumption. As there are generally difficulties in obtaining data about the consumption of the types of energy on the grid level, methods were developed which allow to determine the local energy consumption by using the relevant structural data. The methods used for the Federal Republic of

Germany and neighbouring countries and the results for the Upper Rhine Valley, obtained by these methods, are presented. The cadastre of waste heat is based on data of the year 1973 which was a time of great energy consumption. Only in 1978 this energy consumption was exceeded. To be able to estimate the change in the influence of the anthropogeneous waste heat during the next 20 years, the cadastre was extrapolated until the year 2000. (Atomindex citation 11:546586)

NP-25185 PC **A06**/MF **A01**
Tata Inst. of Fundamental Research, Bombay (India).
Solid Fuel Cooking Stoves.
Nov 80, 120p
U.S. Sales Only.

Efforts are now being made by various researchers to design more efficient and less expensive cooking stoves. A survey of significant world literature on solid fuel cooking stoves is presented. It provides a systematic presentation of all the known stove designs with suitable illustrations. It does not however recommend any single design for universal application. The publication should be useful to the stove designers and also to those who want to know more about solid fuel cooking stoves. (ERA citation 06:007881)

N81-16569/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
Housing Authority of Baltimore City-Public Housing Energy Workshop.
T. S. Golden. 1980, 49p NASA-TM-82050
Workshop Held at Easton, MD., 21-23 Sep. 1980.

The NASA/Baltimore Applications Project operating at the Goddard Space Flight Center was called upon by the Housing Authority of Baltimore City to consider the problems of providing low cost public housing because of increased energy costs and suggest methods for correction and alleviation. The first step chosen was to elicit as many different options for solution as possible through means of a Public Housing Energy Workshop held in Easton, Md. in September 1980. A final role for the Workshop was a listing and qualifying of each alternative as to its suitability and cost. Specific areas were examined by three panels: (1) Systems, (2) Conservation and Motivation, and (3) Fuels. Each panel was made up of persons from differing but appropriate backgrounds; membership was not restricted to housing people alone. A summary of their deliberations is given - it will be used as a stepping stone to further selection and implementation of alternatives.

N81-16581/3 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Criteria for Evaluation of Reflective Surface for Parabolic Dish Concentrators.
F. Bouquet. 15 Jul 80, 67p NASA-CR-163898, DOE/JPL-1060-39
Contract NAS7-100
Sponsored in Part by Doe.

Commercial, second surface glass mirror are emphasized, but aluminum and metallized polymeric films are also included. Criteria for sealing solar mirrors in order to prevent environmental degradation and criteria for bonding sagged or bent mirrors to substrate materials are described. An overview of the technical areas involved in evaluating small mirror samples, sections, and entire large gores is presented. A basis for mirror criteria was established that eventually may become part of inspection and evaluation techniques for three dimensional parabolic reflective surfaces.

N81-16584/7 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Huntsville, AL. George C. Marshall Space Flight Center.
Development and Testing of Heat Transport Fluids for Use in Active Solar Heating and Cooling Systems.
Final Report.
J. C. Parker. Jan 81, 43p NASA-TM-82395
Contract NAS8-32255
Sponsored in Cooperation with Doe Prepared in Part by Houston Chemical Corp., Corpus Christi, Tex.

Work on heat transport fluids for use with active solar heating and cooling systems is described. Program objectives and how they were accomplished including problems encountered during testing are discussed.

ORNL/TM-7580 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Economic Application, Design Analysis, and Material Availability for Ceramic Heat Exchangers.
V. J. Tennergy. Jan 81, 74p
Contract W-7405-ENG-26

Fuel consumption in an industrial process can be reduced by 40% or more by using recuperation or regeneration to heat air for the burners compared with use of ambient temperature air for fuel combustion with furnace gases in the range of 1300 exp 0 C and air preheat temperatures above 800 exp 0 C. Alloy temperature limitations and corrosion of the alloys severely limit the use of metal recuperators to preheat air above about 600 exp 0 C. Structural ceramics, such as silicon carbide, offer promise for use in high-temperature HXs for recovering waste heat from hot flue gases. An assessment was made of industrial attitudes toward advanced high-temperature ceramic recuperators. Three promising industrial processes are identified where these recuperators could be applied. Conceptual designs of ceramic recuperators are given consistent with the furnace requirements for these processes. The annual national fuel saving possible for the three applications of these recuperators is estimated. The applications included steel soaking pit, aluminum remelting, and glass melting furnaces. Installation of these advanced ceramic recuperators on the three types of industrial furnaces considered would save $228 million annually based upon an assumed recuperator performance and $3.10/GJ energy costs. Simple payback times are 1 to 1.5 years for the recuperators based upon assumed cost escalations to 1984, if ceramic tubing costs can be reduced to one-fifth of present values. (ERA citation 06:007913)

PB81-151219 PC **A07**/MF **A01**
Portland State Univ., OR.
Gasoline Demand in the Pacific Northwest.
Interim rept. 1 Sep 79-31 Dec 80,
Robert DeRyke, Rocco Falotico, Jane Fredrickson, Sharon Johnson, and Kuan-Pin Lin.
Oct 80, 128p PNRC-9117-05
Contract PNRC-10990117

This report is intended to lead to a better understanding of the nature of gasoline demand: its seasonality, responsiveness to price changes, and sensitivity to voluntary conservation programs. This paper also analyzes the impact of the Emergency Energy Conservation Act (EECA) on the Pacific Northwest.

PB81-151615 PC **A03**/MF **A01**
Johns Hopkins Univ., Laurel, MD. Applied Physics Lab.
Energy Programs at the Johns Hopkins University Applied Physics Laboratory.
Quarterly rept. Jul-Sep 80,
K. Yu, R. von Briesen, J. E. Tillman, F. C. Paddson, and S. Kane. Nov 80, 39p JHU/APL/EQR/80-3
Contracts DE-AIO1-79ET27025, DOE-EX-76-A-36-1008
See also report for Apr-Jun 80, PB81-104242.

The report is divided into four sections. The first, Geothermal Energy Development Planning and Technical Assistance contains reports on the progress of geothermal-related tasks on which effort was concentrated. The second section, Operational Research, Hydroelectric Power Development, contains reports on small-scale hydroelectric investigations in the southeastern states. The third section, Seismotectonic Investigations, reports on neotectonic investigations of the Manhattan Prong. The fourth section, Energy Conversion and Storage Techniques, contains three articles: an evaluation of the Einstein refrigerator, OTEC pilot plant performance calculations, and a study of landfill methane recovery.

PB81-154015 PC **A05**/MF **A01**
Calculon Corp., Arlington, VA.
Review of the Department of Energy's Conservation and Solar Energy Programs: A Report to the President and Congress.
Final rept.
Jan 81, 80p EPA-600/7-81-001
Contract EPA-68-02-3078

This report summarizes findings and views gathered during the past year on Section II of the Federal Nonnuclear Energy Research and Development Act (Public Law 93-577). Individuals from various sectors of the government and private industry met in a series of workshops and a National hearing to review Federal energy conservation and solar energy programs. The discussion focused primarily on four key issues: energy policy analysis; program evaluation; DOE state and local assistance programs; research, development and application.

PB81-154098 PC **A19**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Conservation and Alternative Fuels in the Transportation Sector.
Technical rept.
25 Jun 80, 439p

This report presents a set of new transportation energy conservation policy initiatives. From an energy efficiency viewpoint the efforts to improve the efficiency of automobiles, airplanes and trucks can be most effective. Likewise, shifting passengers from automobiles and airplanes to buses and trains, and shifting freight from aircraft and trucks to trains (and where practical, marine or pipeline modes) will provide the largest energy savings.

PNL-3615 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Application of Optical Triangulation Profilometry and Optical Phase Ranging Profilometry to the Figure Evaluation of Solar Mirrors.
J. W. Griffin, and M. A. Lind. Dec 80, 43p
Contract AC06-76RL01830

The techniques of optical triangulation profilometry (OTP) and optical phase ranging profilometry (OPRP) are proposed for evaluation of the figure of solar mirrors. The theoretical basis for each method is discussed and the results of initial feasibility experiments are reported. In OTP and OPRP the de-specularized mirror surface is probed with one or more visible laser beams. In OTP, two beams are required for the triangulation of coordinates on the mirror surface. In OPRP the second laser beam is retained within the instrument to form the reference leg of a long wavelength interferometer. Both methods are particularly adaptable to computer control for fast, automated analysis of mirror surfaces. In addition the proposed devices are compact and sturdy enough for easy implementation in field evaluation programs. The experimental resolution capability of the unoptimized OTP system is greater than or equal to 0.1 inch (2.54 mm). With further improvement of the beam projection and coincidence assessment systems, the design resolution goal of greater than or equal to 0.1 mm appears achievable. The results of the preliminary resolution capability experiments on the OPRP system are inconclusive. This is thought to be a result of poor performance of components comprising the modulation and detection subsystems. A full assessment of OPRP capability will require a further investigation effort. (ERA citation 06:007503)

SAND-79-8184 PC **A06**/MF **A01**
Foster-Miller Associates, Inc., Waltham, MA.
Development of an Automatic Heliostat Cleaning System. Final Technical Report.
P. Tremblay, and E. Poulin. Dec 80, 120p
Contract AC04-79DP00789

An automatic washing system was designed consisting of a water treatment system, a pressurized underground water distribution system, an automatic spray washing module for each heliostat, a water collection system, and appropriate controls to operate this equipment. In order to determine the required values for the various washing parameters, a series of washing tests was undertaken in which mirrors were soiled and then cleaned by a high pressure water spray. Reflectivity was measured for the clean, soiled and washed conditions to determine the effectiveness of the cleaning. A he-

liostat spray module was constructed and operated mainly to obtain information on the mechanical operation of one concept. This testing showed that this system was generally satisfactory, but did show some areas for improvement. Water distribution and waste water systems were designed and evaluated with the main conclusion that conventional waste water collection is complex and the most expensive part of the system. The total system is shown to be cost effective if site meteorological conditions do not supply a large number of cycles of natural cleaning occurrences. Continued development of this concept by constructing a small scale washing system within an existing heliostat field is recommended. (ERA citation 06:007198)

SAND-80-0984 PC **A15**/MF **A01**
Sandia Labs., Albuquerque, NM.
Proceedings of the Vertical Axis Wind Turbine (VAWT) Design Technology Seminar for Industry.
S. F. Johnston, Jr. Aug 80, 339p CONF-8004128-
Contract AC04-76DP00789
Vertical axis wind turbine (VAWT) design technology seminar on industry, Albuquerque, NM, USA, 1 Apr 1980.

The objective of the Vertical Axis Wind Turbine (VAWT) Program at Sandia National Laboratories is to develop technology that results in economical, industry-produced, and commercially marketable wind energy systems. The purpose of the VAWT Design Technology Seminar or Industry was to provide for the exchange of the current state-of-the-art and predictions for future VAWT technology. Emphasis was placed on technology transfer on Sandia's technical developments and on defining the available analytic and design tools. Separate abstracts are included for presented papers. (ERA citation 06:007670)

SAND-80-1964 PC **A03**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Midtemperature Solar Systems Test Facility Program for Predicting Thermal Performance of Line-Focusing, Concentrating Solar Collectors.
T. D. Harrison. Nov 80, 29p
Contract AC04-76DP00789

The program at Sandia National Laboratories, Albuquerque, for predicting the performance of line-focusing solar collectors in industrial process heat applications is described. The qualifications of the laboratories selected to do the testing and the procedure for selecting commercial collectors for testing are given. The testing program is outlined. The computer program for performance predictions is described. An error estimate for the predictions and a sample of outputs from the program are included. (ERA citation 06:007504)

SERI/PR-623-425 PC **A05**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Basic and Applied Research Program. Progress Report, 1 January 1979-30 September 1979.
A. J. Nozik. Nov 80, 92p
Contract AC02-77CH00178

The Basic and Applied Research (B and AR) Program is designed to conduct advanced research not addressed by the existing US Department of Energy's (DOE) national solar technology programs. The B and AR Program comprises four independent tasks: photoconversion, materials research, energy resource assessment, and new concepts. The photoconversion task conducts research in photobiological, photochemical, and photoelectrochemical energy conversion to develop systems to produce fuels, chemicals, or electricity at high efficiencies. Results on photobiological hydrogen production using photosynthetic bacteria, water splitting by green algae, biological photoelectrochemical cells, basic studies of photosensitization using bacteriochlorophyll as a model, theoretical conversion efficiencies, redox catalysis, theory and models of photoelectrochemical cells, new electrode materials, and new electrolytes are presented. The materials research task includes research to understand and develop new materials to overcome the limitations of operating in a solar-stressed environment and to improve the efficiency, reliability, and cost of various solar energy conversion systems. Results on photodegradation studies of polymeric materials and glazing materials, corrosion monitoring in solar conversion systems, water vapor sorption by desiccants, black chrome degradation, Cu sub 2 S charaterization, silver alloy coatings and mirror degradation, and black cobalt electrodeposition are presented. The energy resource assessment (ERA) work is reported elsewhere. The new concepts task explores new solar energy conversion schemes that are not part of existing research programs. Results are reported on thermoelectric energy conversion and desiccant cooling. (ERA citation 06:007156)

SERI/TR-733-603 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Accelerated Commercialization Program for Materials and Components. Solar Sheet Glass: An Example of Materials Commercialization.
R. Livingston, and B. Butler. Mar 80, 29p
Contract EG-77-C-01-4042

The SERI Accelerated Commercialization Program for Materials and Components is designed to serve as a catalyst in promoting technological change through the introduction of new materials into solar technologies. This report focuses on technological diffusion of advances in materials technology from the developer to the manufacturers of solar equipment. It provides an overview and understanding of the problems encountered in the private sector in trying to advance technological change and discusses a program designed to facilitate this change. Using as example of solar sheet glass, this report describes the process by which sample quantities of new materials are sent to solar equipment manufacturers for appliations testing. It also describes other materials that might undergo testing in a similar way. The entire program is an example of how government and industry can work together to accomplish common goals. (ERA citation 05:022236)

STU-76-6892 PC **A14**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Cellulosateknik.
Energy Conserving Chip Refining.
1979, 324p
In Swedish.
U.S. Sales Only.

Separate abstracts are prepared for 8 papers presented on energy conservation during processing of wood and wood products. (ERA citation 06:007914)

THE-7-1980 PC **A06**/MF **A01**
Tekniska Hoegskolornas Energiarbetsgrupp, Stockholm (Sweden).
Community Without Oil. A Report on Technical R and D to Support Our Ability to Provide Energy.
G. Luthman, and G. Lagermalm. 1980, 110p
In Swedish.
U.S. Sales Only.

The report gives a review of the energy use and energy related activities in Sweden, tries to evaluate the possible impacts of new energy technology under development, and identifies areas where more R and D are needed and makes suggestions for research programs. (ERA citation 06:004922)

10B. Power Sources

AD-A094 714/3 PC **A04**/MF **A01**
United Technologies Corp., South Windsor, CT. Power Systems Div.
Optimization of Carbon-Supported Platinum Catalysts for Fuel Cell Electrodes.
Final technical rept. Oct 79-Oct 80,
H. R. Kunz, F. J. Luczak, and G. A. Gruver. Dec 80, 51p Rept no. PSD/UTC-FCR-2834
Contract DAAK70-79-C-0151

The objective of this program was to optimize electrodes using the carbon-supported platinum catalysts at the operating conditions required for use in methanol-air, phosphoric-acid electrolyte, fuel cell power plants for U.S. Army applications. Cathodes using proprietary, supported-platinum catalyst, GSA-6, were fabricated with various degrees of hydrophobicity by adjusting the Teflon content in the catalyst layer and by changing the Teflon sintering cycle. These cathodes were tested with supported-platinum anodes in eighteen subscale cells at the Army power plant operating conditions for periods exceeding 5000 hours. The optimum structure, on the basis of peak cell voltage, endurance stability, and manufacturing reproducibility was found to be one containing 47.5% Teflon. A standard United proprietary anode catalyst showed satisfactory peak performance and endurance stability. The cells with optimized electrodes exceeded the program 500-hour performance goal of 0.620V at 200 mA/cubic centimeters by 0.020V. The 6000-hour performance goal of 0.590 V at 200 mA/cubic centimeters was projected to be exceeded by 0.036 to 0.038 V (based on over 4000 hours of operation).

AD-A094 827/3 PC **A06**/MF **A01**
Martin Marietta Aerospace, Denver, CO. Denver Div.
Terrestrial Photovoltaic System Analysis.
Final rept. Feb-Nov 79,
Matthew S. Imamura, Roger Giellis, and Robert L. Moser. Jul 80, 118p MCR-80-683, AFWAL-TR-80-2074
Contract F33615-79-C-2001

The purpose of this program was to evaluate the use of an actively cooled photovoltaic power system at Tinker Air Force Base, Oklahoma, which required both electrical and thermal energy. The thrust of the study was to identify a preliminary design of an actively cooled photovoltaic concentrator configuration including the necessary details of integrating it into the facility, and compare the cost of this system and that of the present energy sources. A conventional utility-connected arrangement was selected for the Tinker AFB electroplating facility mainly because of simplictiy in its implementation and availability of the inverter, which is the key component in the system. The system uses a direct energy transfer arrangement with a peak array power tracking inverter; no electrochemical storage batteries are used. The thermal energy distribution system interfaces directly with the plating tanks in the facility. The estimated initial installed cost of the combined photovoltaic/thermal system is $28 per Watt. The use of thermal energy for the plating tanks is costly ($3 per Watt) because of an extensive distribution system and use of exotic heat exchangers. One conclusion, therefore, is that an electric-only photovoltaic system is more cost effective. (Author)

ANL/OTEC-BCM-012 PC **A06**/MF **A01**
Dow Chemical U.S.A., Freeport, TX. Texas Div.
Study of the Effects of Interleakage of Ammonia and Seawater on Corrosion and Scaling of Candidate Materials for OTEC Heat Exchngers. Final Report.
W. D. Grimes, C. F. Schrieber, and J. A. Manning. Jul 80, 102p
Contract W-31-109-ENG-38

Assessment has been made on the effect of small concentrations of ammonia in seawater and varying concentrations of seawater in anhydrous ammonia upon corrosion and scaling of candidate OTEC heat exchanger materials - A1-5052, Alclad 3003, copper alloys 706, 715 and 722, AL-6X stainless steel and CP titanium. Results are presented. AL-6X stainless steel and CP titanium showed exceptional corrosion resistance to all test environments. Alclad alloy 3003 showed satisfactory performance in seawater and seawater plus ammonia environments. Only minimal pitting was observed and this was limited to the sacrificial cladding in seawater plus ammonia only. Cladding alloy 7072 showed unacceptable corrosion resistance in anhydrous ammonia containing low seawater concentrations. Al-5052 tubes showed unsatisfactory corrosion behavior in the presence of seawater flow with ammonia interleakage. Copper alloys considered showed unacceptable corrosion resistance in all seawater environments containing ammonia. Low pressure differentials between seawater and anhydrous ammonia in the tube testing unit resulted in scaling and moderately efficient plug seal formation at the artificial leak sites of the tubes. It is recommended that Alclad

3003, CP titanium and AL-6X stainless steel tubes be assessed for suitability in the presence of probable OTEC cleaning systems. (ERA citation 06:007210)

ANL/OTEC-BCM-013 PC **A03**/MF **A01**
International Nickel Co., Inc., Wrightsville Beach, NC. LaQue Center for Corrosion Technology, Inc.
Effect of Mechanical Cleaning on Seawater Corrosion of Candidate OTEC Heat Exchanger Materials. Part 1. Tests with M.A.N. Brushes.
D. G. Tipton. Sep 80, 34p
Contract W-31-109-ENG-38

Corrosion evaluations were conducted on 3003 Alclad, 5052 aluminum, C7 0600 copper-nickel, AL-6X stainless steel, and commercially-pure titanium in natural seawater under simulated OTEC heat exchanger conditions to investigate the erosion-corrosion effects of mechanical tube cleaning. Test conditions of M.A.N. brush cleaning and M.A.N. brush cleaning + chlorination were compared with no mechanical cleaning over a seven month period. M.A.N. brushing significantly accelerated corrosion of 5052 aluminum and C7 0600 copper-nickel. Chlorination significantly accelerated erosion-corrosion of 3003 Alclad and 5052 aluminium. Chlorination somewhat decreased erosion-corrosion of C7 0600 copper-nickel. There was no detectable effect of M.A.N. brushing or chlorination on AL-6X stainless steel or titanium, although AL-6X exhibited crevice corrosion at tubing connections. 3003 Alclad and 5052 aluminum exhibited piting corrosion in all 3 test environments. (ERA citation 06:007211)

ATR-79(7694-07)-2 PC **A04**/MF **A01**
Aerospace Corp., El Segundo, CA. Energy and Resources Div.
Preliminary Analysis of the Impact on Utility Distribution Systems of Power Feedback from Residential Photovoltaic Systems.
W. A. Kammer. Mar 79, 52p
Contract AT03-76ET30351

The objective of this study is to make a preliminary but quantitative assessment of the technical and cost impacts on utility distribution systems resulting from the feedback of power into the grid from on-site residential photovoltaic systems. It was assumed that the photovoltaic systems were intended, and designed, primarily to serve the electric loads of the homes on which they were located. It was further assumed that any power generated in excess of these requirements would be fed back into the utility distribution grid to serve other loads. Results are presented and discussed. (ERA citation 06:007191)

ATR-79(7694-07)-4 PC **A05**/MF **A01**
Aerospace Corp., El Segundo, CA. Energy and Resources Div.
Analysis of Photovoltaic/Thermal Electric Power Plant Systems.
D. F. Gluck, and W. A. Kelley. Mar 79, 99p
Contract AT03-76ET30351

A conceptual definition and performance evaluation of a 100 megawatt (MW) hybrid photovoltaic/thermal electric power plant has been carried out. The concept utilizes the ability of gallium arsenide photovoltaic cells to achieve high conversion efficiency at high incident fluxes and elevated temperatures. Solar energy is focused by a field of steerable mirrors (heliostats) onto a tower mounted receiver whose outer surface is covered with gallium arsenide (AlGaAs/GaAs) solar cells and whose inner surface is a water boiler. The solar cells convert a fraction of the incident radiation into electrical energy, and the remaining energy is extracted at approximately 200 exp 0 C and used to power a Rankine cycle turbine generator (bottoming cycle). Water is used as the solar cell array coolant, as the thermodynamic working fluid, and as the thermal energy storage medium. Parametric studies were conducted to select conceptual design parameters and operational characteristics which imply the lowest levelized busbar electric energy costs. Parameters varied were collector area, condenser surface area, fan power, ambient temperature, and electric and thermal energy storage capacities. The report describes the concept, outlines the design analysis method, summarizes the parametric study results, and defines the selected plant configuration. The lowest levelized busbar electric energy generation cost, 70 mills/kilowatt-hr., was achieved with a relatively small collector area, 0.8 x 10 exp 6 square meters, and no stored energy. A rough comparison of this combined power plant with a similar photovoltaic plant, operated at lower solar cell temperature and with no bottoming cycle, showed the busbar cost of electricity (BBEC) from the combined system to be approximately 9% lower. (ERA citation 06:007196)

COO-4450-79/1 PC **A11**/MF **A01**
Michigan State Univ., East Lansing. Div. of Engineering Research.
Planning Manual for Utility Application of WECS.
G. L. Park. Jun 79, 245p
Contract EG-77-S-02-4450

A two-part approach for evaluating the feasibility of wind electric conversion systems (WECS) for utility application is presented and explained. Assessment of wind energy potential, sites, interconnection, and capital and production costing is included. The first part is a brief preliminary procedure used to determine whether the expense and effort of a detailed investigation is justified. The preliminary procedure requires assumptions which limit its accuracy. If the result indicates that WECS have probable potential for a specific utility application, then a set of modifications to detailed conventional planning procedures is developed. The modifications include discussion of wind velocity estimation and effects of site features on wind velocity, institutional problems, siting, choosing generation cases with WECS, reliability considerations, production costing, and operating problems. Appendices include an annotated bibliography, wind measurement methods, procedure for estimating WECS capacity factor, and a method for generating correlated wind velocity samples for use in production cost programs. (ERA citation 05:025852)

DOE/CS/40023-T2 PC **A05**/MF **A01**
Cyclomatic Industries, Inc., San Diego, CA.
Highly Efficient Welding Power Supply. Final Report, May 1, 1978-September 30, 1980.
J. M. Thommes. Sep 80, 81p
Contract AC03-78CS40023

The results and findings of an energy efficient welding power development project are presented. The power source developed is to be used for electric arc welding processes in which 3.5 trillion Btu of energy (1978 example year) can be saved annually. The power source development incorporates the use of switch mode power supply techniques in order to convert industrial supply mains (230/460 VAC 3 phi 60 Hz) to appropriate welding voltages and currents (up to 32 volts/up to 300 amps). A series capacitor switch mode power circuit was the circuit technique chosen in order to optimize energy efficiency, costs, reliability, size/weight, and welding performance. Test results demonstrated an effective efficiency (taking into account idle power consumption) of 80 to 91% for the energy efficient power source while the conventional types of power sources tested ranged from 41 to 74% efficiency. Line power factor was also improved for the energy efficient power source. Field tests indicated additional refinements of weld process performance and power source audible noise emission reduction could be beneficial. (ERA citation 06:007908)

DOE/DP/00789-T10 PC **A03**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Design of a 20-KWp Photovoltaic Concentrator Experiment at Fauquier High School, Warrenton, Virginia.
18 Oct 79, 43p
Contract AC04-76DP00789

Solar Corporation designed a photovoltaic concentrator system for Fauquier High School in Warrenton, Virginia, 40 miles west of Washington, DC. The system provides both electrical energy from the photovoltaic modules and thermal energy from the cooling of those modules. Direct current electrical energy from the photovoltaic modules will be first converted to ac and then used to provide power for lighting in the vocational/technical building and the system control building. Instead of being rejected, the thermal energy collected is stored in a 6500-gallon tank for use in the wintertime to provide heat for a greenhouse located adjacent to the array. The photovoltaic system supplies 20 kWp of electrical power by means of 40 6' wide by 10' long parabolic-cylinder collectors mounted in a polar mode. The photovoltaic power is fed into a switching system to feed either photovoltaic power or utility power to nine 2 kW lighting circuits in the vocational technical school and to fan, pump and auxiliary loads in the control building. Conceptual system design, systems analysis, and prototype performance are described. (ERA citation 06:007192)

DOE/EIA-0180(78) PC **A07**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Gas Turbine Electric Plant Construction Cost and Annual Production Expenses, 1978. Sixth Annual Supplement.
C. L. Lay, and L. J. Prete. Oct 80, 143p

This supplement presents detailed data for 1978 on plant investment, annual production expenses, and related information for 435 of the major gas turbine power plants of 10 MW or larger in the U.S. These data are included on the accompanying plant data sheets. These data were taken from the 1978 Annual Reports of privately-owned electric utilities, and publicly-owned electric utilities, supplemented by data on some physical and operating characteristics taken from the 1978 Annual Power System Statement and the Monthly Power Plant Report. (ERA citation 06:004949)

DOE/ET/11303-T8 PC **A03**/MF **A01**
Eco-Control, Inc., Cambridge, MA.
Fabrication and Testing of TAA Bonded Carbon Electrodes. Final Report, March 1978 - May 1979.
F. Walsh. 1980, 47p
Contract AC03-78ET11303

The objective of this program is to evaluate metallated dihydrodibenzo tetraazannulene (TAA) as a primary fuel-cell cathode catalyst where the TAA is covalently bonded to the conductive cathode matrix. Under the program, cobalt TAA was demonstrated to be an active oxygen dissolution reaction catalyst; bonded cobalt TAA was also demonstrated to be stable in a primary fuel cell with performance data obtained for a one month full cell test. Details of some of the key results and achievements are presented. Cobalt TAA bonded to Vulcan XC-72 was shown to be stable in 150 exp 0 C concentrated phosphoric acid for periods of over one month. Cathodes fabricated from cobalt TAA bonded to Vulcan XC-72 were tested in primary fuel cells: preliminary tests showed that bonded-CoTAA has activity similar to platinum on a per weight metal basis; performance of 100 mA/cm exp 2 at 650 to 700 mV vs hydrogen was obtained at 110 exp 0 C with oxygen. Bonded-CoTAA catalyzed cathodes were tested in primary fuel cells for periods of up to one month and shown to provide stable performance at 110 to 130 exp 0 C. Bonding of TAA was shown to improve its catalytic performance. (ERA citation 06:007857)

DOE/ET/13114-T3 PC **A02**/MF **A01**
Energy Research Group of Western New York.
Electrode Optimization for Phosphoric Acid Fuel Cells. Quarterly Technical Progress Report No. 3.
L. Christner. 5 Oct 78, 18p
Contract AC01-78ET13114

Progress is reported on the following tasks: 1) carbon selection, treatment, and characterization, 2) catalyst impregnation and characterization, 3) electrode teflonation and preparation, 4) electrode backing development, 5) fuel cell testing, and 6) analysis. (ERA citation 06:007858)

DOE/ET/13114-T4 PC **A03**/MF **A01**
Eco-Control, Inc., Cambridge, MA.
Fabrication and Testing of TAA Bonded Carbon Electrodes in Primary Fuel Cells. Technical Progress Report No. 2, June 1978 - September 1978.
13 Oct 78, 31p
Contract AC03-78ET11303

Cobalt dibenzotetraazannulene (CoTAA) has been covalently linked via an acyl ligand to carbon (Vulcan XC-72). This bonded-CoTAA has been

shown, in rotating disk electrode tests, to have catalytic activity equal to platinum on a weight percent basis for the oxygen dissolution reaction at room temperature in concentrated phosphoric acid. Bonded-CoTAA has been shown to be stable in 150 exp 0 C concentrated phosphoric acid. Performance of bonded-CoTAA as a cathode in a primary fuel cell will be determined in the next quarter. (ERA citation 06:007859)

DOE/ET/23007-4 PC **A04**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg.
CdSiAs sub 2 Thin Films for Solar Cell Applications. Final Report, April 5, 1979-April 8, 1980.
L. C. Burton, and L. H. Slack. Jun 80, 71p
Contract AC04-79ET23007

Compounds of Cd-Si-As required for sputtering targets and evaporation charges were synthesized by direct fusion. These include CdSiAs sub 2 , Cd sub 3 As sub 2 , CdAs sub 2 and SiAs. Polycrystalline ingots of CdSiAs sub 2 were found to be porous, with the chalcopyrite structure, and with minor amounts of other phases such as CdAs sub 2 , SiAs,As and Cd sub 3 As sub 2 . Sputtered films were formed in a single target RF system. A homogeneous CdSiAs sub 2 target was initially used, followed by composite targets consisting of CdAs sub 2 + Si. Films from the latter targets were superior to the others and were more extensively studied. As deposited films were amorphous, off stoichiometry, with resistivities over 10 exp 8 omega -cm and band gaps of approx. 1.4 eV. Subsequent reactive heat treatments in the 515 exp 0 to 615 exp 0 C range resulted in crystalline films, resistivities of 1 to 10 omega cm, CdSiAs sub 2 compositions within 1% of stoichiometry, energy gap of approx. 1.55 eV, absorption coefficient of 2 x 10 exp 4 cm exp -1 at 0.6 mu m, but with poor mechanical properties (mainly cracking). A Ta/SiO sub 2 substrate proved to be the best for these films. Thermal evaporation studies of CdSiAs sub 2 established that effusion is preferential toward Cd between 570 and 710 exp 0 C, and toward As in the 710 to 1010 exp 0 C range. All films resulting from CdAs sub 2 charges were found to be Cd deficient. For these reasons, over the last 6 months of the program, only sputtered films were studied further. Preliminary CdSiAs sub 2 /CdS junctions were formed on bulk and sputtered CdSiAs sub 2 . The bulk junctions produced photoresponse up to 0.25V and several mu A. The thin film junctions were rectifying, but generated insignificant photoresponse, apparently due to the poor properties of the CdSiAs sub 2 films. (ERA citation 06:007142)

DOE/JPL-1012-49 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Photovoltaic Module Soiling Studies, May 1978-October 1980.
A. R. Hoffman, and C. R. Maag. 1 Nov 80, 51p
Contract AI01-76ET20356

The retention of particulate contamination on the surface of flat-plate photovoltaic devices is adversely affecting electrical performance of outdoor-exposed modules. The results of an experimental study being performed by the Jet Propulsion Laboratory's Low-Cost Solar Array Project to characterize and understand the effects of outdoor contaminants on sensitive optical surfaces of flat-plate photovoltaic modules and cover materials are described. Comparative electrical and optical performance data from photovoltaic modules and materials subjected to outdoor exposure at field test sites throughout the United States have been collected and examined. The results show significant time- and site-dependence. During periods when natural removal processes do not dominate, the rate of particulate contamination accumulation appears to be largely material-independent. The effectiveness of natural removal processes, especially rain, is strongly material-dependent. Glass and acrylic top-cover materials retain fewer particles than silicone rubber does. Side-by-side outdoor exposure testing for long duration is presently the most effective means of evaluating soiling differences between materials. Changes in spectral transmission as a function of time and location and limited scattering data are presented. (ERA citation 06:007193)

DOE/JPL/954331-80/12 PC **A05**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Silicon Materials Task of the Low-Cost Solar Array Project (Phase IV). Effects of Impurities and Processing on Silicon Solar Cells. Twentieth Quarterly Report, July-September 1980.
R. H. Hopkins, M. H. Hanes, J. R. Davis, A. Rohatgi, and P. Rai-Choudhury. 14 Nov 80, 80p
Contract NAS-7-100-954331

The overall objective of this program is to define the effects of impurities, various thermochemical processes and any impurity-process interactions upon the performance of terrestrial solar cells. The results of the study form a basis for silicon producers, wafer manufacturers, and cell fabricators to develop appropriate cost-benefit relationships for the use of less pure, less costly solar grade silicon. Spectral response measurements made on single crystal and polycrystalline silicon solar cells containing specific impurities agreed well with measured cell efficiencies. For polycrystalline cells it is shown that both grain boundaries and metallic impurities reduce carrier lifetime, resulting in reduced red response and reduced cell efficiency. Spectral response and DLTS measurements on chromium-doped polycrystalline silicon cells indicate an interaction between chromium and grain boundaries; the nature of this interaction is not yet understood. Measurements were made to evaluate possible long term effects of copper contamination on solar cell performance. Nine groups of cells, including a baseline cell group, are undergoing electrical/temperature tests to determine whether electric fields play a role in long term cell degradation. A mathematical model for impurity effects in high efficiency solar cells has been developed. (ERA citation 06:007143)

DOE/JPL/955624-80/2 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Silicon Dendritic Web Material Process Development. Second Quarterly Report.
R. E. Stapleton, D. L. Meier, L. Sienkiewicz, R. B. Campbell, and P. Rai-Choudhury. 17 Nov 80, 49p
Contract NAS-7-100-955624

The properties of the cells to be used in the first 30 cm by 60 cm module are given. The average efficiency was 12.4 +- 0.8%. The highest efficiency measured was 14.2%. A satisfactory lamination has been made with polyvinyl butyral replacing ethylene vinyl acetate. (ERA citation 06:007147)

EPRI-AP-1562 PC **A08**/MF **A01**
Lockheed Missiles and Space Co., Inc., Palo Alto, CA.
Electrode Materials for Coal-Fired MHD Generators. Final Report, October 1980.
R. A. Perkins. Oct 80, 163p

This report presents the results of an investigation to evaluate metallic materials as electrodes for coal-fired MHD generators. A laboratory test that simulates the electrochemical and corrosive environment was developed and used to characterize electrode behavior in a diffuse current flow (nonarcing) mode of operation. High current density requires that an electron transport mechanism of current flow be maintained. With inert, stable electrodes, anode polarization occurs and ionic conduction prevails, limiting current to low values. The nature of this behavior and approaches to overcoming anodic polarization have been studied as a function of electrode material, slag composition, and temperature. It is concluded that by operating at high temperatures and with controlled slag chemistries to produce a very fluid slag, depolarization may be achieved by mechanical mixing. Interrupted current flow may be required to aid in breaking down anodic polarization. High current density by diffuse flow with stable electrodes is believed possible and recommendations for continuing research to develop a practical approach are presented. (ERA citation 06:007855)

EUR-6794DE PC **A06**/MF **A01**
Commission of the European Communities, Luxembourg.
Comparison of the Working Plant Conditions for Conventional and Nuclear Steam Power Plants in the Community.
K. Plate, D. Nitsch, H. Schmitz, and H. Teichel.
1980, 106p
In German.
U.S. Sales Only.

Information is presented on methods for determining availability values for conventional and nuclear power plants; comparison of work availability and 8 o'clock availability; the availability of conventional and nuclear power plants in West Germany and in the European Communities (EC); principal causes of non-availability for EC nuclear power plants; and a listing of nuclear power plants in the EC. (ERA citation 06:004755)

FE-2357-31 PC **A04**/MF **A01**
General Electric Co., Schenectady, NY. Energy Systems Programs Dept.
PFB Coal Fired Combined Cycle Development Program: Commercial Plant Economic Analysis (Task 1.6).
Nov 80, 60p
Contract AC21-76ET10377

The objectives of this program are to evaluate the Coal Fired Combined Cycle (CFCC) power plant conceptual design and to conduct supporting development programs for pressurized fluidized bed technology advancement in combustion/steam generator, gas turbine and hot gas cleanup technologies. The Coal-Fired Combined Cycle is the unique power plant concept developed under the leadership of the General Electric Company to provide a direct coal-burning gas turbine and steam turbine combined-cycle power plant. The advantages of the combined cycle for higher efficiency and the potential of the pressurized fluidized bed combustor improvements in emissions could offer a new and attractive option to the electric utility industry. The CFCC approach provides for cooling the fluid bed combustor through the use of steam tubes in the bed which supply a steam turbine generator. The partially cooled combustion gases drive a gas turbine generator after passing through a hot gas cleanup train. The Conceptual CFCC Commercial Plant has been defined in Report No. Fe-2357-28. This design, being conceptual in nature, has not been improved through the formal cost reduction iteration/design program. An economic analysis of this baseline plant is provided in this report. The General Electric Company believes that the combustion of coal by the pressurized fluidized bed process is one of the most effective and efficient means for the utilization of coal with respect to both environmental considerations and the cost of electricity. (ERA citation 06:007694)

FE-6010-22 PC **A03**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Materials Research for the Clean Utilization of Coal. Quarterly Progress Report, October-December 1979.
1979, 48p
Contract EA-77-A-01-6010

Work was concentrated on completing the evaluation of the chrome-spinel refractory (Corhart RFG); this includes creep and swelling measurements at 1400 exp 0 C, 1500 exp 0 C and 1600 exp 0 C. The results indicated considerable deformation at all testing temperatures. The specimen tested at 91 psi and 1600 exp 0 C failed catastophically. Four new furnaces will be installed for the planned expansion of the creep facilities. The dependence of the electrical conductivity of Y sub 95 Ca sub 05 CrO sub 3 on oxygen pressure in the range of pressures from 10 exp 0 to 10 exp -6 atmospheres have been completed for temperatures from 1300 exp 0 to 1600 exp 0 C. The apparatus has been rebuilt to allow measurements in the high temperature range at oxygen pressure from 10 exp -6 to 10 exp -15 atmospheres. A three probe electrochemical cell has been constructed and the electrochemical effects measured at a temperature of 1254 exp 0 C. This cell allows the measurement of slag-electrode voltages as a function of time and ultimate analyses of the electrochemical effects. The first series of experiments on the electrical conductivity of Bow NH slag has been completed. The conductivity at low temperatures (below 1100

exp 0 C) depends on the crystalline state of the slag. The conductivity at high temperature (above 1400 exp 0 C) is independent of the oxygen pressure and of the amount of K present at least up to 6% by weight. Type 304 stainless steel tubes, cooled to 400 exp 0 C, 500 exp 0 C and 590 exp 0 C, were exposed to fuel rich and oxygen rich hot gas streams seeded with a mixture of 80% by weight K sub 2 CO sub 3 and 20% by weight K sub 2 SO sub 4 . (ERA citation 06:007856)

LA-UR-80-3190 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Explosive Flux Compression Generators for Rail Gun Power Sources.
C. M. Fowler, D. R. Peterson, R. S. Caird, D. J. Erickson, and B. L. Freeman. 1980, 20p CONF-801138-3
Contract W-7405-ENG-36
Electromagnetic guns and launchers conference, San Diego, CA, USA, 4 Nov 1980.

A class of explosive magnetic flux compression generators is described that has been used successfully to power rail guns. A program to increase current magnitudes and pulse lengths is outlined. Various generator loss terms are defined and plans to overcome some of them are discussed. Included are various modifications of the conventional strip generators that are more resistant to undesirable expansion of generator components from magnetic forces. Finally, an integral rail gun is discussed that has coaxial geometry. Integral rail guns utilize the rails themselves as flux compression generator elements and, under ideal conditions, are theoretically capable of driving projectiles to arbitrarily high velocities. Integral coaxial rail guns should be superior in some regards to their square bore counterparts. (ERA citation 06:008058)

NE-25173 PC **A09**/MF **A01**
Liber Foerlag, Stockholm (Sweden).
Off-Shore Wind Power Plants.
R. Hardell, C. Olsson, and L. Ljung. 1979, 192p
In Swedish.
U.S. Sales Only.

Information is presented concerning the offshore wind power availability in the Baltic Sea; and economics, specifications, and environmental considerations for large offshore wind power plants. (ERA citation 06:004734)

N81-16570/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Performance Calculations for 1000 MWe MHD/Steam Power Plants.
C. C. P. Pian. 1981, 15p NASA-TM-81667, DOE/NASA/10769-13
Contract DE-A101-77ET-10769
Presented at the 19TH Aerospace Sci. Meeting, St. Louis, 12-15 Jan. 1981; Sponsored by Aiaa.

The effects of MHD generator operating conditions and constraints on the performance of MHD/steam power plants are investigated. Power plants using high temperature combustion air preheat (2500 F) and plants using intermediate temperature preheat (1100 F) with oxygen enrichment are considered. Variations of these two types of power plants are compared on the basis of fixed total electrical output (1000 MWe). Results are presented to show the effects of generator plant length and level of oxygen enrichment on the plant thermodynamic efficiency and on the required generator mass flow rate. Factors affecting the optimum levels of oxygen enrichment are analyzed. It is shown that oxygen enrichment can reduce magnet stored energy requirement.

N81-16571/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Off-Design Analysis of a Gas Turbine Powerplant Augmented by Steam Injection Using Various Fuels.
R. J. Stochl. Nov 80, 29p NASA-TM-81611, E-609

Results are compared using coal derived low and intermediate heating valve fuel gases and a conventional distillate. The results indicate that steam injection provides substantial increases in both power and efficiency within the available compressor surge margin. The results also indicate that these performance gains are relatively insensitive as to the type of fuel. Also, in a cogeneration application, steam injection could provide some degree of flexibility by varying the split between power and process steam.

N81-16573/0 PC **A10**/MF **A01**
Mathtech, Inc., Princeton, NJ.
Advanced Cogeneration Technology Economic Optimization Study (Acteos).
Final Report.
P. Nanda, Y. Ansu, E. H. Manuel, Jr., and W. G. Price, Jr. 15 Dec 80, 211p NASA-CR-163887, REPT-2150
Contract JPL-955559
Sponsored in Part by Doe Prepared for JPL.

The advanced cogeneration technology economic optimization study (ACTEOS) was undertaken to extend the results of the cogeneration technology alternatives study (CTAS). Cost comparisons were made between designs involving advanced cogeneration technologies and designs involving either conventional cogeneration technologies or not involving cogeneration. For the specific equipment cost and fuel price assumptions made, it was found that: (1) coal based cogeneration systems offered appreciable cost savings over the no cogeneration case, while systems using coal derived liquids offered no costs savings; and (2) the advanced cogeneration systems provided somewhat larger cost savings than the conventional systems. Among the issues considered in the study included: (1) temporal variations in steam and electric demands; (2) requirements for reliability/standby capacity; (3) availability of discrete equipment sizes; (4) regional variations in fuel and electricity prices; (5) off design system performance; and (6) separate demand and energy charges for purchased electricity.

N81-16574/8 PC **A08**/MF **A01**
Fairchild Stratos Corp., Manhattan Beach, CA.
Dish Stirling Solar Receiver Program.
Final Report.
R. A. Haglund. 15 Dec 80, 174p NASA-CR-163889, JPL-9950-473
Contracts NAS7-100, JPL-955400
Prepared for JPL.

A technology demonstration of a Dish Stirling solar thermal electric system can be accomplished earlier and at a much lower cost than previous planning had indicated by employing technical solutions that allow already existing hardware, with minimum modifications, to be integrated into a total system with a minimum of development. The DSSR operates with a modified United Stirling p-40 engine/alternator and the JPL Test Bed Concentrator as a completely integrated solar thermal electric system having a design output of 25 kWe. The system is augmented by fossil fuel combustion which ensures a continuous electrical output under all environmental conditions. Technical and economic studies by government and industry in the United States and abroad identify the Dish Stirling solar electric system as the most appropriate, efficient and economical method for conversion of solar energy to electricity in applications when the electrical demand is 10 MWe and less.

N81-16575/5 PC **A08**/MF **A01**
Kinetic Coatings, Inc., Burlington, MA.
Development of Simplified Process for Environmentally Resistant Cells.
Final Report, 8 Jun. 1978 - 30 Nov. 1980.
W. J. King. Dec 80, 166p NASA-CR-163884, DOE/JPL-955079-80/1
Contract JPL-955079
Sponsored in Part by Doe Prepared for JPL.

This report describes a program to develop a simple, foolproof, all vacuum solar cell manufacturing process which can be completely automated and which results in medium efficiency cells which are inherently environmentally resistant. All components of the completed cells are integrated into a monolithic structure with no material interfaces. The exposed materials (SI, Al2O3, Al, Ni) are all resistant to atmospheric attack and the junction, per se, is passivated to prevent long term degradation. Such cells are intended to be incorporated into a simple module consisting basically of a press formed metallic superstructure with a separated glass cover for missile, etc., protection.

N81-16576/3 PC **A05**/MF **A01**
Solar Power Corp., Woburn, MA.
Design, Fabrication, Test, Qualification and Price Analysis for Third Generation Design Solar Cell Modules.
Final Report.
15 Sep 80, 99p NASA-CR-163917, DOE/JPL-955403-80/1
Contract JPL-955403
Sponsored in Part by NASA and Doe Prepared for JPL.

An updated program plan is presented showing the task descriptions depicting the work, progress, achievements, and the cause of any deviations from the original plan (SC-1), and how this impacted on the original schedule of the program. In addition there is an update documenting all design alterations made during the pre-production phase and a complete up to date set of engineering and manufacturing documentation (CM-1). The purpose of the work in the original plan was to explore, design, develop, test, and deliver 1000 watts of prototype flat plate, photovoltaic modules appropriate for use in applications in the 20 to 500 kilowatt range and which show potential for meeting the 1986 cost goals.

N81-16577/1 PC **A05**/MF **A01**
Motorola, Inc., Phoenix, AZ. Semiconductor Group.
The Automated Array Assembly Task of the Low-Cost Silicon Solar Array Project, Phase 2.
Final Report, 1 Apr. 1979 - 31 MAR. 1980.
M. G. Coleman, R. A. Pryor, T. G. Sparks, R. M. Legge, and D. L. Saltzman. 1980, 98p NASA-CR-163880, DOE/JPL-954847-80/8
Contract JPL-954847
Sponsored by Doe Prepared for JPL.

Several specific processing steps as part of a total process sequence for manufacturing silicon solar cells were studied. Ion implantation was identified as the preferred process step for impurity doping. Unanalyzed beam ion implantation was shown to have major cost advantages over analyzed beam implantation. Further, high quality cells were fabricated using a high current unanalyzed beam. Mechanically masked plasma patterning of silicon nitride was shown to be capable of forming fine lines on silicon surfaces with spacings between mask and substrate as great as 250 micrometers. Extensive work was performed on advances in plated metallization. The need for the thick electroless palladium layer was eliminated. Further, copper was successfully utilized as a conductor layer utilizing nickel as a barrier to copper diffusion into the silicon. Plasma etching of silicon for texturing and saw damage removal was shown technically feasible but not cost effective compared to wet chemical etching techniques.

N81-16578/9 PC **A12**/MF **A01**
RCA Labs., Princeton, NJ.
Automated Array Assembly, Phase 2.
Final Report, 1 Sep. 1977 - 31 Dec. 1979.
R. V. Daiello. Oct 80, 259p NASA-CR-163878, DOE/JPL-954868-80/9
Contracts NAS7-100, JPL-954868
Sponsored in Part by Doe Prepared for JPL.

A manufacturing sequence which is capable of mass producing silicon solar cells is described. The sequence was arrived at after the evaluation of many processes and three related manufacturing sequences which are discussed.

N81-16579/7 PC **A04**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA.
Cell Module and Fuel Conditioner Development.
Quarterly Rept., Jul. - Sep. 1980.
D. Q. Hoover, Jr. Oct 80, 68p NASA-CR-165189, DOE/NASA/0161-5
Contracts DEN3-161, DE-AI03-79ET-11272

Measurements of stack height changes with temperature and cell material characteristics were made. Stack 559 was assembled and components were fabricated for 560, 561, and 562. Stack 425

was transferred from the parallel DOE program and installed in the OS/IES simulation loop for mechanical and electrical testing. Construction and preliminary checkout of the 2 kW test facility was completed and design and procurement of the 8 kW test facility was initiated. The fuel conditioning subsystem design continued to evolve, and the state points for the current design were calculated at full and part load conditions. Steam reforming catalyst activity tests were essentially completed and aging tests and CO shift converter tests were initiated.

N81-16580/5 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Photovoltaic Module Soiling Studies, May 1978 - October 1980.
A. R. Hoffman, and C. R. Maag. 1 Nov 80, 52p
DOE/JPL-1012-49, JPL-PUB-80-87
Contracts NAS7-100, EX-76-A-29-1012

Comparative electrical and optical performance data from photovoltaic modules and materials subjected to outdoor exposure at field test sites throughout the United States were collected and examined. The results show significant time and site dependence. During periods when natural removal processes do not dominate, the rate of particulate contamination accumulation appears to be largely material-independent. The effectiveness of natural removal processes, especially rain, is strongly material-dependent. Glass and acrylic top cover materials retain fewer particles than silicone rubber does. Side by side outdoor exposure testing for long duration is presently the most effective means of evaluating soiling differences between materials. Changes in spectral transmission as a function of time and location and limited scattering data are presented.

N81-16582/1 PC **A05**/MF **A01**
Boeing Aerospace Co., Seattle, WA.
Electrostatic Bonding of Thin (Cycle Sine 3 MIL) 7070 Cover Glass to TA2O5 AR-Coated Thin (Cycle Sine 2 MIL) Silicon Wafers and Solar Cells.
D. W. Egelkrout. Jan 81, 77p NASA-CR-165240, D180-26200-1
Contract NAS3-22216

Electrostatic bonding of thin cover glass to thin solar cells was researched. Silicon solar cells, wafers, and Corning 7070 glass of from about 0.002" to about 0.003" in thickness were used in the investigation to establish optimum parameters for producing mechanically acceptable bonds while minimizing thermal stresses and resultant solar cell electrical parameter degradation.

N81-16900/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
High Power Densities from High-Temperature Materials Interactions.
J. F. Morris. 1981, 22p NASA-TM-81626, DOE/NASA/1062-7
Contract EC-77-A-31-1062
Presented at 16TH Thermophys. Conf., High Temp. Mater. Session, Palo Alto, Calif., 23-25 Jun. 1981; Sponsored by Aiaa.

Thermionic energy converters and metallic-fluid heat pipes are well suited to serve together synergistically. The two operating cycles appear as simple and isolated as their material problems seem forebodingly deceptive and complicated. Simplified equations verify material properties and interactions as primary influences on the operational effectiveness of both. Each experiences flow limitations in thermal emission and vaporization because of temperature restrictions redounding from thermophysicochemical stability considerations. Topics discussed include: (1) successful limitation of alkali-metal corrosion; (2) protection against external hot corrosive gases; (3) coping with external and internal vaporization; (4) controlling interfacial reactions and diffusion; and (5) meeting other thermophysical challenges; expansion matches and creep.

PNL-SA-8968 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Assessment of Solar Options for Large Power Applications.
W. J. Apley. Oct 80, 12p CONF-8010129-1
Contract AC06-76RL01830
Solar central receiver semi-annual meeting, San Francisco, CA, USA, 15 Oct 1980.

Comparative analyses of solar thermal conversion concepts were performed with the purpose of characterizing, evaluating, and ranking the principal solar thermal power concepts under consideration in the DOE-Solar Thermal Power Program, on the basis of an engineering and economic analysis of alternative power plant configurations. Conceptual designs developed for the selected systems were based on common assumptions of available technology in the 1990 to 2000 time frame. No attempt was made to perform a detailed optimization of each conceptual design. Rather, designs best suited for a comparative evaluation of the concepts were formulated. Costs were estimated on the basis of identical assumptions, ground rules, methodologies, and unit costs of materials and labor applied uniformly to all of the concepts. Seven generic types of collectors, together with associated subsystems for electric power generation, were considered in the study. The collectors can be classified into three categories: (1) two-axis tracking (with compound-curvature reflecting surfaces), (2) one-axis tracking (with single-curvature reflecting surfaces), and (3) nontracking (with low-concentration reflecting surfaces). Results are presented. (ERA citation 06:007197)

PNL-2004-11 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Development, Characterization and Evaluation of Materials for Open Cycle MHD. Quarterly Report, June 1979.
J. L. Bates, and D. D. Marchant. Oct 79, 28p

The objectives of this program are to develop, test, characterize, and evaluate materials for open-cycle, coal-fired MHD power generators. The specific immediate goals emphasize electrode and insulator materials, including: (1) testing and evaluation of the enhanced effects of alkali seed on materials in a dc electric field; (2) development and testing of improved electrodes and insulators with controlled microstructures, compositions and properties; and (3) characterization and evaluation of materials relating to both the US MHD Program and the US-USSR Cooperative Program for MHD power generators. Progress is reported. (ERA citation 05:026014)

PSI-TR-245 PC **A04**/MF **A01**
Physical Sciences, Inc., Woburn, MA.
Task Report No. 3. Systems Analysis of Organic Rankine Bottoming Cycles.
D. Bloomfield, and S. Fried. Dec 80, 62p
Contract AC21-80MC14361

A model was developed that predicts the design performance and cost of a Fuel Cell/Rankine cycle powerplant. The Rankine cycle utilizes the rejected heat of an 11.3 MW phosphoric acid fuel cell powerplant. Improvements in the total plant heat rate and efficiency of up to 10% were attainalbe, using ammonia as the working fluid. The increase in total plant cost divided by the increase in total plant power ranged from $296/kW to $1069/kW for the cases run, and was a strong function of ambient temperature. The concept appears to be capable of producing substantial energy savings in large fuel cell powerplants, at reasonable costs. However, a much more detailed study that includes such factors as duty cycle, future cost of fuel and site meteorology needs to be done to prove the design for any potential site. (ERA citation 06:007860)

SAN-1109-76-3 PC **A05**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
Solar Pilot Plant: Phase I. Quarterly Report No. 3, April--June 1976. CDRL Item No. 10.
28 Oct 76, 84p
Contract EY-76-C-03-1109

The baseline design for a 10 MW proof-of-concept pilot central receiver solar power plant is described. Detailed designs for the collector, steam generator, and thermal storage subsystem research experiments are presented. (ERA citation 04:025950)

SAND-78-7056 PC **A06**/MF **A01**
Rockwell International, Thousand Oaks, CA. Electronics Research Center.
Gallium Arsenide Photovoltaic Dense Array for Concentrator Applications. Final Report.
J. A. Cape, R. L. Bernescut, J. S. Harris, and J. R. Oliver. Dec 80, 108p
Contract AC04-76DP00789

The goal of this contract was to explore the feasibility of operating a photovoltaic subsystem on a solar central receiver with emphasis on the possible application of the photovoltaic device as part of a compound receiver for cogeneration of heat and electricity - a so-called total energy system. To this end, the specific objective of the contract was to design, fabricate and test a dense array of GaAs concentrator cells, the tests to be performed on the Sandia National Laboratories' Central Receiver Test Facility (CRTF). Specific requirements for the array design were (1) achieve 16% array efficiency (including area losses) at 1000 SUNs, (2) yield a working output voltage between 220 to 300 volts, (3) have integral heat sinking optimized for efficient total energy utilization, (4) meet the test conditions of 25 exp 0 to 180 exp 0 C and 50 to 1500 SUNs, (5) have a modular structure so that larger units could be built up, (6) be compatible with CRTF test system (coolant loop, and optical acceptance angle, etc.), and (7) be protected against shorts, shadowing, individual cell open circuit failure and load fluxuations. Progress is reported including design, performance, and testing details. (ERA citation 06:007154)

SAND-80-2461 PC **A03**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Fundamental Studies of Grain Boundary Passivation in Polycrystalline Silicon with Application to Improved Photovoltaic Devices. Research Report Covering Work Completed from January-July 1980.
C. H. Seager, and D. S. Ginley. Aug 80, 46p
Contract AC04-76DP00789

Calculations have been made of the a.c. properties of silicon grain boundaries based on the simple DDL/TE model. Experimental data obtained on bicrystals are shown to be in good agreement with these predictions. The anomalously large values of the low frequency capacitance are shown to be due to modulation of the barrier height by injected charge. Calculations of the properties of illuminated grain boundaries are also detailed and some preliminary conclusions are presented. Several new improved methods for the introduction of atomic hydrogen into polysilicon are discussed. By using EBIC characterization of polysilicon diodes it has been demonstrated that the hydrogen passivation process not only removes substantial amounts of trapped grain boundary charge, but also eliminates essentially all minority carrier recombination in these regions. Methods for reducing the hydrogen exposure time necessary to achieve this passivated condition are discussed. (ERA citation 06:007155)

SERI/PR-9237-1-T1 PC **A03**/MF **A01**
Lockheed Palo Alto Research Labs., CA.
Amorphous Thin Films for Solar Cell Applications. Technical Progress Report, 15 July 1980 to 10 October 1980.
A. D. Jonata, W. W. Anderson, J. L. Crowley, and H. F. Jr. Thorton, J. A. MacMillan. 10 Oct 80, 37p
Contract AC02-77CH00178

A series of experiments performed to develop successful back-layer contacts for a MIS solar cell and to study the effects of argon inclusion on the properties of the active intrinsic layer in the a-Si:H cell are described. Mixtures of argon (Ar), phosphine (Ph sub 3), and hydrogen (H sub 2) were used at various partial pressures to assess the effectiveness of doping with a reactive gas. The inclusion of argon in dc reactively-sputtered films was measured using specially prepared cathode image samples and the results correlated with the SiH sub 2 / SiH ratio in the films. Details are reported. (ERA citation 06:007157)

SERI/TR-8041-9-T1 PC **A04**/MF **A01**
State Univ. of New York at Buffalo. Dept. of Electrical Engineering.

Fabrication and Testing of MIS Solar Cells on a-Si:F:H. Final Report, September 15, 1979-September 15, 1980.
M. K. Han, and W. A. Anderson. 3 Nov 80, 56p
Contract AC02-77CH00178

Fabrication techniques and improved a-Si:H film processing have been achieved to produce a short circuit current density of 7.5 mA/cm exp 2 and open circuit voltage of 740 mV on large area (2cm exp 2) a-Si cells by the deposition of an inexpensive semitransparent metal (Cr) as a top electrode on a N-I-P structure. This corresponds to a 2% efficiency using AMI illumination. A V/sub oc/ of 830 mV and fill factor of 0.54 have also been separately obtained. A relatively simple and inexpensive deposition technique using a one pumpdown vacuum system, Al grid and thin metal film structure have been applied to reduce the cost of a-Si:H cell fabrication. A SEM study of a-Si film quality shows the substrate texture to greatly influence the film morphology. This in turn serves to influence the uniformity of photovoltaic response on completed solar cells. The studies of optical transmittance of various thin metal films promote the utilization of Cr and Cu as a top electrode. Dark and illuminated I-V characteristics show that current conduction mechanisms and recombination pheonomena are not the same under dark and illuminated conditions. Furthermore, spectral response analysis and reverse illuminated saturation current under different illumination levels show photoconductivity and collection efficiency to be a function of illumination level. Significant differences in spectral response are observed when comparing P-I-N, N-I-P and I-N structures. A Schottky barrier lowering effect is proposed to explain some spectral response data. The importance of the top junction region to carrier collection is also discussed. (ERA citation 06:007158)

TULEA-1979-02 PC **A02**/MF **A01**
Luleaa Univ. (Sweden).
Influence of a Proposed Pumped Storage Hydro-Power Plant on the Thermal Stratification of Lake Ivoe, Sweden.
L. Bengtsson. 1979, 12p CONF-7910200-1
Symposium on the prospects of hydroelectric schemes under the new energy situation and on the related problems, Athens, Greece, 15 Oct 1979.
U.S. Sales Only.

Model tests have shown that by building a shallow dam at the outlet the discharge from the upper reservoir can be distributed over such a large width that the kinetic energy is dissipated before the flow reaches levels deeper than 10 m. Since the summer thermocline is situated at 15 m and the epilimnion is homothermal the discharge does not affect the thermal stratification of the lake during the summer. For the same reason the breakdown of the thermocline in the autumn is not affected. In the early summer a thermocline is developed at about 8 m, but in about a week the thermocline level is lowered below 10 m. The discharge affects the thermal structure of the upper 10 m, but since the water soon becomes homogenous down to and below this level, the effect is very small and hypolimnion temperature is not affected. However, the effect of increased turbidity on the absorption of short wave radiation has not been taken into account. In the early winter, the surface water of the lake will cool slightly faster than if no pumpage took place, but an equilibrium condition will soon be obtained. Temperature profiles observed in Lake Ivoe are shown and one can see that a thermocline usually exists at a depth of about 15 m and that the water of the epilimnion as well as the water of the hypolimnion is well mixed. (ERA citation 06:006105)

10C. Energy Storage

AD-A094 660/8 PC **A05**/MF **A01**
Altus Corp., San Jose, CA.
Primary Lithium-Thionyl Chloride Cell Evaluation.
Final rept. Sep 79-Apr 80,
A. E. Zolla, R. Waterhouse, D. DeBiccari, and G. L. Griffin. Aug 80, 93p AFWAL-TR-80-2076
Contract F33615-79-C-2072

A Test program was conducted to evaluate the Altus 1350AH cell performance against the Minuteman Survival Ground Power requirements. Twelve cells of the 17 inch diameter, 1-3/8 inch heights were fabricated and tested during this study. Under discharge rates varying from C/100 to C/400 at ambient temperature, thevolumetric and gravimetric energy density performance requirements of 15 watt hours per cubic inch and 150 watt hours per pound were exceeded in all cases. All other performance requirements of voltage, current, configuration, capacity volume, weight, electrolyte leakage (none), and maintainability (none required), were met or exceeded. The abuse testing demonstrated the Altus Cell's ability to safely withstand short circuit by external shorting, short circuit by penetration with a conductive object, forced discharge, and forced charging of a cell. Disposal of discharged cells by incineration is an environmentally safe and efficient method of disposal. (Author)

AD-A094 699/6 PC **A06**/MF **A01**
Dayton Univ., OH. Research Inst.
Non-Aqueous Electrode Research.
Final technical rept. 1 Oct 77-25 Jul 80,
R. G. Keil, William E. Moddeman, T. N. Wittberg, J. R. Hoenigman, and P. S. Zaidain. Oct 80, 104p UDR-NM-TR-80-27, AFWAL-TR-80-2094
Contract F33615-77-C-3156
See also Rept. nos. AFAPL-TR-79-2003, AD-A068 751 and AFWAL-TR-80-2018, AD-A085 154.

The faradaic and non-faradaic reactivity of lithium in the thionyl chloride battery system has been studied using AES, XPS, and SEM/EDAX. The passivating film has been characterized as lithium chloride and found to contain substantial quantities of aluminum and sulfur. XPS results show definitely that in battery discharged lithium sulfur occluded within the passive film is present in multiple oxidation states, including sulfide. The reactivity of the lithium metal surface with O2, CO2, CO, and N2 was studied. The 'black spots' were synthesized and analyzed as a lithium oxynitride. A model for ion transport across the passivating lithium chloride film was postulated and its implications discussed. The current interrupt method was tested on a model system. An A/D interface and associated software was developed to enable rapid, accurate data acquisition. (Author)

AD-A094 910/7 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
Pulsed High Voltage and High Current Outputs from Homopolar Energy Storage System.
Memorandum rept.,
R. D. Ford, D. Jenkins, W. H. Lupton, and I. M. Vitkovitsky. 4 Feb 81, 16p Rept no. NRL-MR-4433

Large energy storage capability of inertial-inductive systems provides an attractive option for satisfying the pulse power requirements associated with such applications as plasma confinement and heating, electromagnetic projectile acceleration and with production of intense radiation. These applications require high rate of energy delivery to the load at specific current and voltage levels. In conjunction with self-excited homopolar generator current source, an opening technology has been developed to provide up to 1 MJ output pulses, alternately, at hundreds of kilovolts or at megampere levels. The overall system efficiency, that depends sensitively on the load requirements, was measured over a range from 10% to more than 90% for different pulser-load circuit arrangements. (Author)

DOE/ET/29232-T1(V.3) PC **A10**/MF **A01**
Sargent and Lundy, Chicago, IL.
Characterize and Explore Potential Sites and Prepare Research and Development Plan (Site Investigation Study). Final Draft. Task 2. Milestone Report.
Dec 80, 202p
Contract AC02-78ET29232

A specific research and development plan to investigate the behavior and suitability of aquifers as compressed air energy storage (CAES) sites is presented. The proposed effort will evaluate present uncertainties in the performance of the underground energy storage subsystem and its impact on above ground plant design and cost. The project is planned to provide the utility industry with a quantitative basis for confidence that financial commitment to a demonstration plant and subsequent expansion is justified and poses acceptable risks. Activities in Phase II of a 5-phase overall CAES development program are reported. Information is included on the development of field testing specifications and schedules; selection of specific site for the conceptual design; development plan and schedule for the media site; development of analytical models of aquifer airflow; and well drilling requirements. As a result of these studies 14 sites in Illinois and Indiana were evaluated, 7 were ranked for suitability for CAES, and 4 were selected for possible use in the field testing program. Test procedures, the mathematical models and drilling requirments were developed. (ERA citation 06:007782)

DOE/ET/29232-T2 PC **A17**/MF **A01**
Public Service Co. of Indiana, Inc., Plainfield.
Compressed Air Energy Storage: Preliminary Design and Site Development Program in an Aquifer. Final Draft, Task 1: Establish Facility Design Criteria and Utility Benefits.
Oct 80, 390p
Contract AC02-78ET29232

Compressed air energy storage (CAES) has been identified as one of the principal new energy storage technologies worthy of further research and development. The CAES system stores mechanical energy in the form of compressed air during off-peak hours, using power supplied by a large, high-efficiency baseload power plant. At times of high electrical demand, the compressed air is drawn from storage and is heated in a combustor by the burning of fuel oil, after which the air is expanded in a turbine. In this manner, essentially all of the turbine output can be applied to the generation of electricity, unlike a conventional gas turbine which expends approximately two-thirds of the turbine shaft power in driving the air compressor. The separation of the compression and generation modes in the CAES system results in increased net generation and greater premium fuel economy. The use of CAES systems to meet the utilities' high electrical demand requirements is particularly attractive in view of the reduced availability of premium fuels such as oil and natural gas. This volume documents the Task 1 work performed in establishing facility design criteria for a CAES system with aquifer storage. Information is included on: determination of initial design bases; preliminary analysis of the CAES system; development of data for site-specific analysis of the CAES system; detailed analysis of the CAES system for three selected heat cycles; CAES power plant design; and an economic analysis of CAES. (ERA citation 06:007783)

EPRI-EM-1514 PC **A05**/MF **A01**
Public Service Electric and Gas Co., Newark, NJ.
Battery Energy Storage Test (BEST) Facility: Second Progress Report, December 1979.
A. Pivec, and E. A. Hyman. Aug 80, 87p
Contract AC02-76ET29368

The Battery Energy Storage Test (BEST) Facility will be a national center for testing and evaluating battery energy storage systems, including associated electrical conversion equipment, developed for use on electric power grids. The BEST Facility program consists of four phases: design, construction, testing and acceptance, and operation. This interim progress report covers a middle period (July 1978 to December 1979) in construction of the facility, in procurement of major items of operating equipment, in developing plans for testing and acceptance of the facility prior to its use, and also in developing the plans for testing of advanced batteries during the subsequent operating life of the facility. Approximately one year remains to completion and acceptance. The building is now 90% complete. The power conversion system was completed and successfully factory tested. The station lead-acid battery modules were built, and the factory tests, completed. The station computer (monitor and control system) hardware was completed and software programming was begun. A startup and acceptance test manual was drafted. It will encompass the four-phase test program: factory testing, construction verification testing, oper-

ational testing, and acceptance testing. A Developers Users Group was convened several times, for the purpose of advising on the nature of the test programs and on compiling a Test Programs Guidelines document. Detail planning was also well along for test data processing equipment and procedures. A demonstration of some online computer procedures was given at the annual review meeting, using simulated battery performance data in a data base management system. Planning for the installation of a zinc chloride battery in 1981 in the second test bay was begun. 20 figures. (ERA citation 06:007791)

N81-16387/5 PC **A05**/MF **A01**
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
The Characteristics and Limitations of the MPS/MMS Battery Charging System.
F. E. Ford, C. F. Palandati, J. F. Davis, and C. M. Tasevoli. Nov 80, 92p NASA-TM-81983

A series of tests was conducted on two 12 ampere hour nickel cadmium batteries under a simulated cycle regime using the multiple voltage versus temperature levels designed into the modular power system (MPS). These tests included: battery recharge as a function of voltage control level; temperature imbalance between two parallel batteries; a shorted or partially shorted cell in one of the two parallel batteries; impedance imbalance of one of the parallel battery circuits; and disabling and enabling one of the batteries from the bus at various charge and discharge states. The results demonstrate that the eight commandable voltage versus temperature levels designed into the MPS provide a very flexible system that not only can accommodate a wide range of normal power system operation, but also provides a high degree of flexibility in responding to abnormal operating conditions.

N81-16572/2 PC **A06**/MF **A01**
General Electric Co., Cincinnati, OH. Advanced Energy Programs.
Storage Requirement Definition Study.
Final Report.
L. E. Stacy, G. C. Wesling, and W. F. Zimmerman. 15 Dec 80, 120p NASA-CR-163882, AED-EO-57
Contract JPL-955388
Sponsored by NASA and Doe Prepared for JPL.

A dish Stirling solar receiver (DSSR) and a heat pipe solar receiver with TES (HPSR) for a 25 kWe dish Stirling solar power system are described. The thermal performance and cost effectiveness of each are analyzed minute by minute over the equivalent of one year of solar insolation. Existing designs of these two systems were used as a basis for the study; TES concepts for the DSSR and alternative TES concepts for the HPSR are presented. Parametric performance and cost studies were performed to determine the operating and cost characteristics of these systems. Data are reported for systems (1) without TES and with varying amounts of TES, (2) with and without a fossil fuel combustor, (3) with varying solar to fossil power input, and (4) with different system control assumptions. The principal effects of TES duration, collector area, engine efficiency, and fuel cost sensitivity are indicated. Development needs for each of the systems are discussed and the need and nature of possible future TES solar modular experiments are presented and discussed.

PNL-3625 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Preliminary Survey and Evaluation of Nonaquifer Thermal Energy Storage Concepts for Seasonal Storage.
D. E. Blahnik. Nov 80, 106p
Contract AC06-76RL01830

Thermal energy storage enables the capture and retention of heat energy (or cold) during one time period for use during another. Seasonal thermal energy storage (STES) involves a period of months between the input and recovery of energy. The purpose of this study was to make a preliminary investigation and evaluation of potential nonaquifer STES systems. Current literature was surveyed to determine the state of the art of thermal energy storage (TES) systems such as hot water pond storage, hot rock storage, cool ice storage, and other more sophisticated concepts which might have potential for future STES programs. The main energy sources for TES principally waste heat, and the main uses of the stored thermal energy, i.e., heating, cooling, and steam generation are described. This report reviews the development of sensible, latent, and thermochemical TES technologies, presents a preliminary evaluation of the TES methods most applicable to seasonal storage uses, outlines preliminary conclusions drawn from the review of current TES literature, and recommends further research based on these conclusions. A bibliography of the nonaquifer STES literature review, and examples of 53 different TES concepts drawn from the literature are provided. (ERA citation 06:007787)

STU-75-4891 PC **A05**/MF **A01**
Hagconsult A.B., Stockholm (Sweden).
LNG In Rock. A New Storage Option.
U. Lindblom. Jun 78, 83p
U.S. Sales Only.

The special grouting system for thermal cracks makes it possible to create storage space in blasted rock caverns. Underground cryogen storage is a complicated rock mechanics problem. Safety measures against LNG-rock contact must be taken. The new concept includes drillholes which are pressurized with a grout material that solidifies near -100 exp 0 C. Fractures will successively become filled with grout. Another storage option is to vaporize and compress the gas into large storage chambers at great depth. Economic comparison with surface tanks is made. The research and development work included coupled thermomechanical finite element analysis for modelling thermal crack formation and rock mechanics research on low temperature values for Young's modulus, Poisson's ratio, thermal expansivity coefficient and uniaxial compressive strength. Cylindrical specimens of limestone, sandstone and granite were investigated. Also, the influence of uniaxial stress on the rock mechanics parameters was studied. Increase of stiffness and strength at temperatures far below 0 exp 0 C is believed to be explained by the progressive solidification of mobile water in the rock matrix. Recorded thermal expansions of rock cylinders due to cooling below -90 exp 0 C are believed to be caused also by volume and shape changes of mineral crystals. Laboratory experiments on selected grout materials were accomplished in cooled capillary tubes. Grouting was also demonstrated to be effective in sealing thermal cracks in granite. Underground storage of LNG has some distinct advantages that now need more attention. (ERA citation 06:004535)

STU-78-4981 PC **A04**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden).
Silver-Iron Batteries.
O. Lindstroem. Apr 80, 52p
In Swedish.

Production methods for iron electrodes have been studied. It was found that a sintering temperature of 700 exp 0 C gave the best strength and capacity. Production methods and additions for silver electrodes have also been studied. The capacity of the produced iron and silver electrodes were 1100 mAh/cm3. Different separators have been investigated. Cellophane I and II from Du Pont was found to be the best. In tests open cells have achieved 60% of the calculated capacity. In order to minimize the increase of the pressure in closed cells different additions to the electrodes have been studied. Raney-Palladium have been produced and used as a catalyst for hydrogen recombination. When metal hydrides were added to the cell, the pressure increase was minimized within a certain limit. 23 figures. (ERA citation 06:004903)

11. MATERIALS

11A. Adhesives and Seals

N81-16415/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Moffett Field, CA. Ames Research Center.
Superfluid Helium Leak Sealant Study.
J. W. Vorreiter. Jan 81, 19p NASA-TM-81212, A-8233

Twenty-one leak specimens were fabricated in the ends of stainless steel and aluminum tubes. Eighteen of these tubes were coated with a copolymer material to seal the leak. The other three specimens were left uncoated and served as control specimens. All 21 tubes were cold shocked in liquid helium 50 times and then the leak rate was measured while the tubes were submerged in superfluid helium at 1.7 K. During the cold shocks two of the coated specimens were mechanically damaged and eliminated from the test program. Of the remaining 16 coated specimens one suffered a total coating failure and resulting high leak rate. Another three of the coated specimens suffered partial coating failures. The leak rates of the uncoated specimens were also measured and reported. The significance of various leak rates is discussed in view of the infrared astronomical satellite (IRAS) Dewar performance.

N81-16474/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Self-Acting Geometry for Noncontact Seals.
G. P. Allen. 1981, 19p NASA-TM-81659, E-473
Proposed for Presentation at Ann. Meeting of Asle Pittsburgh, 11-14 May 1981.

Performance ot two self acting seal designs for a liquid oxygen (LOX) turbopump was predicted over ranges of pressure differential and speed. Predictions were compared with test results. Performance of a radial face seal for LOX was predicted up to 448 N/cu cm and 147 m/sec. Performance of a segmented circumferential seal for helium was predicted up to 69 N/cu cm and 189 m/sec. Results confirmed predictions of noncontact operation. Qualitative agreement between test and analysis was found. The LOX face seal evidently operated with mostly liquid in the self acting geometry and mostly gas across the dam.

PATENT-4 202 700
Not available NTIS
Department of Energy, Washington, DC.
Glassy Composition for Hermetic Seals.
Patent,
J. A. Wilder, Jr. Filed 2 May 79, patented 13 May 80, 4p PAT-APPL-6-035 157
Supersedes PAT-APPL-6-035 157.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The invention relates to a glassy composition adaptable for sealing to aluminum-based alloys to form a hermetically-sealed insulator body. The composition may either be employed as a glass or, after devitrifying heat treatment, as a glass-ceramic. (ERA citation 06:004023)

11B. Ceramics, Refractories, and Glasses

KFK-2771 PC **A07**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung.
Influence of Process Parameters and Additives on the Densification, Creep Properties and Strength of Hot Pressed Silicon Nitride.
R. Becker. Mar 79, 131p
In German.Thesis.

U.S. Sales Only.

One method of production of Si sub 3 N sub 4 parts is the hot pressing of powder compacts. According to the current technological know how, a liquid phase building additive (e.g. MgO) is essential for the complete densification of Si sub 3 N sub 4 . In this work it has been shown, how dense Si sub 3 N sub 4 may be produced without the conventional additives. The SiO sub 2 -coating of Si sub 3 N sub 4 particles here results in the liquid phase formation. On the basis of the above concept, the effect of MgO, Mg sub 3 N sub 2 , Al sub 2 O sub 3 and A1N-additions to a pure Si sub 3 N sub 4 powder have been studied in detail and the resulting material properties: densification, creep and high temperature strengths have been determined. Based on the results, it may be concluded, that HPSN is a dispersion of crystalline Si sub 3 N sub 4 in an amorphous matrix (glass content between 4-10 vol%). Depending on the amount and composition of the boundary phase (silicate glass) widely variing material properties may be obtained. (Atomindex citation 11:546541)

LBL-11486 PC **A06**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Sliding Mechanisms for Grain Boundaries Containing Pre-Existing Cavities in A1 sub 2 O sub 3 -SiO sub 2 Ceramics.
A. P. S. Rana. Nov 80, 107p
Contract W-7405-ENG-48
Thesis.

This study examines models of grain boundary sliding when cavities are present at grain boundaries in A1 sub 2 O sub 3 -SiO sub 2 ceramics using the internal friction technique. Two types of microstructure, and the concomitant modes of grain boundary sliding, were distinguished in this study. The first microstructure consisted of grains encompassed by an amorphous phase. The relaxation time has been calculated when grain boundaries have pre-existing cavities. Sliding in single phase microstructure is accommodated by boundary diffusion and by viscous deformation in materials with a glassy grain boundary phase. Relaxation times derived from internal friction measurements were shown to be in fair agreement with theoretical relaxation times. Cavities only had a small contribution to grain boundary sliding. At relatively high temperatures, internal friction rises exponentially to verly large values. This phenomenon (referred to as the high temperature background) is mainfest in polycystalline samples as an upturn in the internal friction on the high temperature side of the peak. A transient analysis pertinent to the high temperature background demonstrated the significance of a dimensionless parameter, which was a function of frequency, grain size, elastic modulus and grain boundary diffusivity. (ERA citation 06:007980)

N81-16240/6 PC **A03**/MF **A01**
Lake Shore Cryotronics, Inc., Westerville, OH.
Evaluation of High Specific-Heat Ceramic for Regenerator Use at Temperatures Between 2-30 K.
Final Report.
W. N. Lawless. Dec 79, 39p NASA-CR-163888, JPL-9950-458
Contracts NAS7-100, JPL-955446
Prepared for JPL.

Specific heat, thermal conductivity (both in the range 2-30 K), and microhardness data were measured on the ceramics labelled LS-8, LS-8A, and LS-8A doped with CsI, SnCl2, and AgCl. A work hardened sample of LS-8A was also studied in an effort to determine the feasibility of using these types of LS-8 materials to replace Pb spheres in the regenerator of the JPL cryocooler. The LS-8A materials are all more than an order of magnitude harder than Pb, and the dopants do not significantly improve the hardness. However, the SnCl2 dopant has a remarkable effect in improving the specific heat and thermal conductivity of LS-8A. The SnCl2 doping level which maximized the regenerator enthalpy change in going from an unloaded to a loaded condition was found to be 0.2 percent SnCl2 in LS-8A. It was also found that the enthalpy change for a regenerator employing the LS-8A material is more than three times larger than for the Pb spheres case. The use of rods, rather than spheres, of optimally doped LS-8A in regenerators is discussed.

PAT-APPL-6-114 446 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Lanthanum-Hexaboride Carbon Composition for Use in Corrosive Hydrogen-Fluorine Environments.
Patent Application,
C. E. Holcombe, Jr., L. Kovach, and A. J. Taylor. Filed 22 Jan 80, 13p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention relates to a structural composition useful in corrosive hydrogen-fluorine environments at temperatures in excess of 1400 exp 0 K. The composition is formed of a isostatically pressed and sintered or a hot-pressed mixture of lanthanum hexaboride particles and about 10 to 30 vol% carbon. The lanthanum-hexaboride reacts with the high-temperature fluorine-containing gases to form an adherent layer of corrosion-inhibiting lanthanum trifluoride on exposed surfaces of the composition. The carbon in the composite significantly strengthens the composite, enhances thermal shock resistance, and significantly facilitates the machining of the composition. (ERA citation 06:005179)

11C. Coating, Colorants, and Finishes

AD-A094 666/5 PC **A24**/MF **A01**
Dayton Univ., OH. Research Inst.
Porcelain Enamel Material Testing Procedures to Determine the Damping Properties and the Results of Selected Materials.
Technical rept. Jan 76-Dec 79,
David M. Hopkins, and Michael L. Drake. Sep 80, 561p UDR-TR-80-47, AFWAL-TR-80-4116
Contracts F33615-79-C-5137, F33615-79-C-5108

This report contains a detailed discussion of methods and procedures used to define the vibration damping properties of high temperature (260 C to 780 C) damping materials. The work was done by the University of Dayton Research Institute, Dayton, Ohio in partial fulfillment of Air Force Contract Number F33615-76-C-5137 for the Materials Laboratory, Wright-Patterson Air Force Base, Ohio. The work described was conducted during the period January 1976 through December 1979. (Author)

AD-A094 718/4 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Incoherent and Laser Photodeposition on Thin Films.
Master's thesis,
Walter E. Johnson. Sep 80, 86p Rept no. AFIT/GEP/PH/80-3
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

High purity Zn, Se, and ZnSe thin films (approximately 100 to 6000A thicknesses) have been deposited on both quartz and sapphire substrates by using a Hg arc lamp u-v light source to photodissociate the organometallic molecules Zn(CH3)2 and Se(CH3)2. Large area depositions (approximately 1.5 cm diameter circles) have been produced, along with masked depositions created by selectively blocking the incoherent light source. Absorption measurements of these organometallic vapors from 0.2 to 20 microns indicates the possibility of producing ultra-high purity thin films by using simultaneously both a CO (5.6 - 5.9 micron) and a CO2 (10.6 micron) laser in conjunction with a pulsed KrF (2480A) in a highly selective two step photodissociation process. Such results offer the potential for a drastically new and greatly improved quality film plus an extremely well controlled alternative to the more conventional thin film deposition techniques such as thermal vacuum deposition, sputtering, and chemical vapor deposition. (Author)

AD-A094 724/2 PC **A04**/MF **A01**
Naval Air Development Center, Warminster, PA. Aircraft and Crew Systems Technology Directorate.
Evaluation of Powder Coatings for Application to Aircraft Component Parts.
Final rept.,
Everett Charves. 4 Sep 80, 65p Rept no. NADC-79199-60

Powder coatings, electrostatically applied to bare and primed aluminum and magnesium substrates, were evaluated as possible candidate coatings for aircraft and engine component parts. The powdered coatings were compared to the solvent based MIL-P-23377 primer and MIL-C-81773 topcoat system. When selected for specific applications, powdered coatings were superior to the solvent based coatings system in abrasion (wear) and chemical resistance. (Author)

PAT-APPL-6-115 866 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Resistive Coating for Current Conductors in Cryogenic Applications.
Patent Application,
C. Hirayama, and G. R. Wagner. Filed 28 Jan 80, 9p
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to a resistive or semiconducting coating for use on current conductors in cryogenic applications. This includes copper-clad superconductor wire, copper wire used for stabilizing superconductor magnets, and for hyperconductors. The coating is a film of cuprous sulfide (Cu sub 2 S) that has been found not to degrade the properties of the conductors. It is very adherent to the respective conductors and satisfies the mechanical, thermal, and electrical requirements of coatings for the conductors. (ERA citation 06:005169)

PATENT-4 199 620
Not available NTIS
Department of Energy, Washington, DC.
Method for Providing Mirror Surfaces with Protective Strippable Polymeric Film.
Patent,
C. C. Edwards, and J. R. Day. Filed 27 Mar 79, patented 22 Apr 80, 6p PAT-APPL-6-024 340
Supersedes PAT-APPL-6-024 340.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This invention is a method for forming a protective, strippable, elastomeric film on a highly reflective surface. The method is especially well suited for protecting diamond-machined metallic mirrors, which are susceptible not only to abrasion and mechanical damage but also to contamination and corrosion by various fluids. In a typical use of the invention, a diamond-machined copper mirror surface is coated uniformly with a solution comprising a completely polymerized and completely cured thermoplastic urethane elastomer dissolved in tetrahydrofuran. The applied coating is evaporated to dryness, forming a tough, adherent, impermeable, and transparent film which encapsulates dust and other particulates on the surface. The film may be left in place for many months. When desired, the film may be stripped intact, removing the entrapped particulates and leaving no residue on the mirror surface. (ERA citation 06:005178)

PB81-857799 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Protective Coatings for Copper and Copper Base Alloys. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 41p NERACASMNT2906

This retrospective bibliography contains citations dealing with protective coatings on copper and copper alloys exclusive of electroplating and electrodeposition. Types of protective coatings and application methods include: paints, polymeric materials, corrosion inhibitors, passivation techniques, anodization, vapor deposition, and metallic and oxide films. (Contains 56 citations, fully indexed and including a table of contents.)

PB81-857807 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Zinc and Zinc Alloys as Protective Coatings. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 75p NERACASMNT2910

This retrospective bibliography contains citations dealing with protective coatings of zinc and zinc alloys exclusive of electroplating and electrodeposition. Types of protective coatings and application methods include: paints, polymeric materials, corrosion inhibitors, passivation techniques, anodization, vapor deposition and metallic and oxide films. (Contains 114 citations, fully indexed and including a table of contents.)

PB81-858474 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Antifouling Coatings for Marine Environments. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 164p NERACASMNT3066

This retrospective bibliography contains citations on the use of antifouling and anticorrosive materials in marine environments. Included are paints, metal cladding and plastic coatings, as well as cathodic protection. The use of marine concrete as a protective media is also included. (Contains 255 citations, fully indexed and including a table of contents.)

PB81-858680 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Protective Coatings for Gas Turbines, Power Plants and in Coal Gasification Environments. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 66p NERACASMNT3068

This retrospective bibliography contains citations on the applications of protective coatings used in high temperature environments commonly encountered in gas turbine and coal gasification installations. These coatings include flame spraying, nickel-aluminum, ceramics, dispersion hardening, sputtered oxides, and thermal barrier coatings. (Contains 83 citations, fully indexed and including a table of contents.)

11D. Composite Materials

AD-A094 679/8 PC **A04**/MF **A01**
Naval Air Development Center, Warminster, PA. Aircraft and Crew Systems Technology Directorate.
Natural Exposure of Selected Graphite/Epoxy Composite Material Systems.
Final rept.,
R. E. Trabocco. 31 Jul 80, 75p Rept no. NADC-80021-60

A study was made on selected graphite/epoxy composite materials exposed at different geographical locations. The Panama exposure site was more detrimental to reduced static strength than the Warminster, PA site. Coating was found to negate irreversible ultraviolet plus moisture degradation. Reversible elevated temperature moisture degradation was approximately 25% for matrix dominated properties. The T300/5208 system offered the best resistance to degradation from natural exposure. The use of a 6 ply 0 deg. + or - 45 deg panel loaded in sustained flexure was found to enhance scatter. (Author)

AD-A094 737/4 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Instability of Short Circular Cylindrical Laminated Composite Shells under Pure Bending.
Master's thesis,
Victor J. Villhard. Dec 80, 109p Rept no. AFIT/GAE/AA/80D-24

Short cylindrical shells made from symmetrical laminated advanced composites were analyzed with the intent of examining the effects of certain shell properties on shell instability. Four laminates were considered over a range of length to radius ratio of 1/2 to 10. Reinforcing fiber stiffness was also varied so that the effects of stiffening the laminates could be observed. Shell bending bifurcation analysis was performed using the STAGS-C computer code with a kinematic end rotation applied to the shell to produce the desired shell bending. Axial compression bifurcation comparison runs were also made using the STAGS-C program.

AD-A094 855/4 PC **A03**/MF **A01**
Stanford Univ., CA. Div. of Applied Mechanics.
Nondispersive Wave Propagation in a Layered Composite.
Interim rept.,
G. Beaupre, and G. Herrmann. Oct 80, 26p Rept no. SUDAM-80-6
Contract N00014-76-C-0054

It is found that it is possible to propagate a horizontally polarized (SH) wave without dispersion through an elastic, periodically-layered composite. The nondispersive property of the wave is due to the fact that at each interface the angle of incidence is such that the wave is totally transmitted without reflection. In optics such an angle is referred to as the Brewster angle. It is determined that this particular case is contained as a special solution of the general dispersion equation for SH waves, which has not been noticed before. (Author)

AD-A094 867/9 PC **A02**/MF **A01**
Stanford Univ., CA. Div. of Applied Mechanics.
An Effective Dispersion Theory for Horizontally-Polarized Waves in Layered Composites.
Interim rept.,
T. J. Delph, and G. Herrmann. Jan 81, 24p Rept no. SUDAM-81-1
Contract N00014-76-C-0054

An extension of a previously developed approximate theory, the effective dispersion theory, for wave propagation in a periodically-layered elastic body is given. While the previous theory was valid only for wave propagation normal to the layering, the present theory removes this restriction in the case of antiplane strain (SH wave) motion. (Author)

AD-A094 868/7 PC **A03**/MF **A01**
Stanford Univ., CA. Div. of Applied Mechanics.
A One-Dimensional Effective Dispersion Theory for Layered Composites.
Interim rept.,
T. J. Delph, and G. Herrmann. Nov 80, 34p Rept no. SUDAM-80-7
Contract N00014-76-C-0054

A new approximate theory for wave propagation in a periodically-layered elastic body is proposed. The theory is based on microstructural theories of elasticity, and makes use of a collocation technique in conjunction with the exact solution for wave propagation in an unbounded elastic body. The results are in excellent agreement with the exact solution. The new theory is considered to hold considerable promise for formulating approximate solutions to boundary-initial value problems for composite bodies. (Author)

AD-A094 894/3 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
Preliminary Characterization of Ion-Plated Aluminum/Graphite Composites.
Memorandum rept.,
R. J. Weimer, A. Pattnaik, and C. Kim. 12 Feb 81, 11p Rept no. NRL-MR-4420

Ion-plated aluminum/graphite (Al/Gr) composite material has been characterized in terms of microstructure, tensile properties, and fractography. Longitudinal and transverse tensile strengths were found to be superior to those of Al/Gr composites fabricated by liquid metal infiltration. More importantly, the Al/Gr precursor tape was thin and flexible enough to allow cross-plying and selective reinforcement in complex shapes. (Author)

AD-A094 934/7 Not available NTIS
Stanford Univ., CA. Div. of Applied Mechanics.
On Dispersion of Periodically Layered Composites in Plane Strain,
A. A. Golebiewska. Oct 79, 2p
Contract N00014-76-C-0054
Availability: Pub. in Jnl. of Applied Mechanics, v102 n1 p206-207 Mar 80 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A095 123/6 MF **A01**
Air Force Materials Lab., Wright-Patterson AFB, OH.
TI-59 Magnetic Card Calculator Solutions to Composite Materials Formulas. Revision.
Final rept. Jan-Dec 80,
Stephen W. Tsai, and Rodolfo Aoki. Jan 81, 74p
Rept no. AFML-TR-79-4040-REV
Revision to report dated Apr 79, AD-A078 043.
Availability: Microfiche copies only.

This volume contains the description and instructions of magnetic cards for TI-59 programmable calculators. These tapes contain the key calculations of the stiffness and strength of unidirectional and laminated composites. Both in-plane and flexural loadings can be applied. The initial stress and strain due to curing moisture adsorption are also included in the strength calculation. With the aid of the magnetic cards, instant calculations can be made for practical use. The use of cards is also an effective teaching tool. The formulas used in the cards and equation numbers have been derived in a book entitled, Introduction to Composite Materials, co-authored by S. W. Tsai and H. T. Hahn, published by Technomic Publishing Company, Westport, CT, July 1980. This TR a revised edition of the technical report bearing the same number published in April 1979. (Author)

AD-A095 147/5 PC **A06**/MF **A01**
Wyoming Univ., Laramie. Dept. of Mechanical Engineering.
Three-Dimensional Elastoplastic Finite Element Analysis of Laminated Composites.
Interim rept.,
Mohamed M. Monib, Donald F. Adams, and David E. Walrath. Nov 80, 123p UWME-DR-001-102-1, ARO-16370.4-MS
Contract DAAG29-79-C-0189
Doctoral thesis.

A three-dimensional elastoplastic analysis of generally orthotropic composite laminates is developed, together with a finite element computer code NCLAP (nonlinear Composite Laminate Analysis Program) for its implementation. The analysis is capable of handling any laminated composite subjected to triaxial mechanical and/or hygrothermal loading conditions. The laminates can consist of any number of orthotropic material piles, of any orientations. Elastoplastic material behavior is included by means of the tangent modulus method. The onset of plastic deformation is determined by a failure surface in three-dimensional space, and is likewise dependent on temperature and moisture. The three-dimensional finite element analysis is based on a displacement formulation employing linear isoparametric elements. Large aspect ratios, typical of laminae finite element representations, are handled by the use of reduced integration techniques. Material properties are input to NCLAP as coefficients of second order polynomials describing the elastoplastic response, and the dependence on temperature and moisture content. Incremental mechanical loadings can be applied as nodal forces and/or prescribed displacements. Hygrothermal loadings are applied as constant overall changes, or as spatial distributions, of temperature and moisture content. Computer Program NCLAP has been developed in modular form, which will permit it to be easily modified to accommodate future extensions of the analysis. (Author)

N81-16129/1 PC **A05**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Tests of Graphite/Polyimide Sandwich Panels in Uniaxial Edgewise Compression.
C. J. Camarda. Dec 80, 79p NASA-TP-1785, L-13998

The local and general buckling behavior of graphite/polyimide sandwich panels simply supported along all four edges and loaded in uniaxial edge-

wise compression were investigated. Material properties of sandwich panel constituents (adhesive and facings) were determined from flatwise tension and sandwich beam flexure tests. Buckling specimens were 30.5 by 33 cm, had quasi-isotropic, symmetric facings, and a glass/polyimide honeycomb core. Core thicknesses were varied and three panels of each thickness were tested at room temperature to investigate failure modes and corresponding buckling loads. Specimens 0.635 cm thick failed by overall buckling at loads close to the analytically predicted buckling load; all other panels failed by face wrinkling. Results of the wrinkling tests indicated that several buckling formulas were unconservative and therefore not suitable for design purposes; a recommended wrinkling equation is presented.

N81-16130/9 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Mechanical Property Characterization of Borsic/Aluminum Laminates at Room and Elevated Temperatures.
R. R. Mcwithey, and D. M. Royster. Dec 80, 65p NASA-TP-1761, L-13763

Six Borsic/aluminum laminate orientations exposed to a braze temperature cycle were tested in tension, compression, and shear to determine tangent modulus, maximum stress and strain, and Poisson's ratio of the laminates at room and elevated temperatures. Mechanical properties in tension were determined from flat tensile and sandwich beam tests. Room temperature flat tensile tests were performed on laminates in the as-received condition to compare with specimens exposed to a braze temperature cycle. Sandwich beam tests were also used to determine mechanical properties in compression. Shear properties were determined from biaxially loaded, picture frame shear specimens. Results are presented by using functional relations between stress and strain and tangent modulus and strain, and in tables by indicating maximum stress and strain and Poisson's ratio.

N81-16131/7 PC **A02**/MF **A01**
Old Dominion Univ., Norfolk, VA. Dept. of Mechanical Engineering and Mechanics.
Determination of Principal Stress in Birefringent Composites by Hole-Drilling Method.
R. Prabhakaran. 1981, 18p NASA-CR-163867
Presented at 36TH Ann. Conf. Of the Soc. Of the Plastics Ind. (Spi) of Reinforced Plastics/Composites Inst., Washington, D.C., 16-20 Feb. 1981.

The application of transmission photoelasticity to stress analysis of composite materials is discussed.The method consists in drilling very small holes at points where the state of stress has to be determined. Experiments are described which verify the theoretical predicitons. The limitations of the method are discussed and it is concluded that valuable information concerning the state of stress in a composite model can be obtained through the suggested method.

N81-16132/5 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Prediction of Composite Thermal Behavior Made Simple.
C. C. Chamis. 1981, 33p NASA-TM-81618, E-624
Presented at the 36TH Ann. Conf. Of the Soc. Of the Plastics Ind. (Spi) Reinforced Plastics/Composites Inst., Washington, D.C., 16-20 Feb. 1981.

A convenient procedure is described to determine the thermal behavior (thermal expansion coefficients and thermal stresses) of angleplied fiber composites using a pocket calculator. The procedure consists of equations and appropriate graphs for various (+ or - theta) ply combinations. These graphs present reduced stiffness and thermal expansion coefficients as functions of (+ or - theta) in order to simplify and expedite the use of the equations. The procedure is applicable to all types of balanced, symmetric fiber composites including interply and intraply hybrids. The versatility and generality of the procedure is illustrated using several step-by-step numerical examples.

N81-16135/8 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Mechanisms of Fatigue Damage in Boron/Aluminum Composites.
W. S. Johnson. Dec 80, 55p NASA-TM-81926
Presented at the Astm Symp. On Damage in Composite Mater.: Basic Mech. Accumulation, Tolerance, and Characterization, BAL Harbour, Fla., 10-14 Nov. 1980.

Tensile fatigue tests were conducted on several laminates of boron/aluminum (6061-0). In laminates with 0 deg fibers on the outside, an analysis that identifies 'shakedown' conditions predicted the stress amplitude below which no fatigue damage accumulated. A fatigue damage accumulation model which relates matrix fatigue cracking and the overall laminate properties is described. A model for the saturation damage stage development is presented, that identical laminates, tested in directions 90 deg apart (such that one layup has 90 deg outer plies and the other 0 deg), have different fatigue behaviors due to the stacking sequence. The 90 deg plies on the surface develop cracks earlier than predicted by shakedown. An attempt was made to explain this stacking sequence effect. Variable load history effects on the fatigue damage response were investigated. Tests reveal that for a given stress ratio the specimen seeks the saturation damage state for the largest stress range to which it is subjected. It was also found that little damage is generated by shifting a given stress range down, whereas significant damage may be created by shifting it upward. The laminate stresses were always tensile.

N81-16136/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Moffett Field, CA. Ames Research Center.
Strain Rate, Temperature, and Humidity on Strength and Moduli of a Graphite/Epoxy Composite.
J. M. Lifshitz. Jan 81, 26p NASA-TM-81247, A-8381

Results of an experimental study of the influence of strain rate, temperature and humidity on the mechanical behavior of a graphite/epoxy fiber composite are presented. Three principal strengths (longitudinal, transverse and shear) and four basic moduli (E1, E2, G12 and U12) of a unidirectional graphite/epoxy composite were followed as a function of strain rate, temperature and humidity. Each test was performed at a constant tensile strain rate in an environmental chamber providing simultaneous temperature and humidity control. Prior to testing, specimens were given a moisture preconditioning treatment at 60 C. Values for the matrix dominated moduli and strength were significantly influenced by both environmental and rate parameters, whereas the fiber dominated moduli were not. However, the longitudinal strength was significantly influenced by temperature and moisture content. A qualitative explanation for these observations is presented.

N81-16137/4 PC **A06**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Large-Scale Carbon Fiber Tests.
R. A. Pride. Dec 80, 104p NASA-TM-80218

A realistic release of carbon fibers was established by burning a minimum of 45 kg of carbon fiber composite aircraft structural components in each of five large scale, outdoor aviation jet fuel fire tests. This release was quantified by several independent assessments with various instruments developed specifically for these tests. The most likely values for the mass of single carbon fibers released ranged from 0.2 percent of the initial mass of carbon fiber for the source tests (zero wind velocity) to a maximum of 0.6 percent of the initial carbon fiber mass for dissemination tests (5 to 6 m/s wind velocity). Mean fiber lengths for fibers greater than 1 mm in length ranged from 2.5 to 3.5 mm. Mean diameters ranged from 3.6 to 5.3 micrometers which was indicative of significant oxidation. Footprints of downwind dissemination of the fire released fibers were measured to 19.1 km from the fire.

N81-16138/2 PC **A06**/MF **A01**
Howard Univ., Washington, DC. Dept. of Mechanical Engineering.
Effect of Load Introduction on Graphite Epoxy Compression Specimens.
Final Report.
R. Reiss, and T. M. Yao. Jan 81, 103p NASA-CR-163919
Contract NAG1-23

Compression testing of modern composite materials is affected by the manner in which the compressive load is introduced. Two such effects are investigated: (1) the constrained edge effect which prevents transverse expansion and is common to all compression testing in which the specimen is gripped in the fixture; and (2) nonuniform gripping which induces bending into the specimen. An analytical model capable of quantifying these foregoing effects was developed which is based upon the principle of minimum complementary energy. For pure compression, the stresses are approximated by Fourier series. For pure bending, the stresses are approximated by Legendre polynomials.

N81-16139/0 PC **A04**/MF **A01**
Boeing Commercial Airplane Co., Seattle, WA.
Environmental Exposure Effects on Composite Materials for Commercial Aircraft.
Quarterly Technical Progress Report, 1 Nov. 1979 - 30 Aug. 1980.
D. J. Hoffman. Aug 80, 56p NASA-CR-165649, D6-44815-9
Contract NAS1-15148

The test program concentrates on three major areas: flight exposure; ground based exposure; and accelerated environmental effects and data correlation. Among the parameters investigated were: geographic location, flight profiles, solar heating effects, ultraviolet degradation, retrieval times, and test temperatures. Data from the tests can be used to effectively plan the cost of production and viable alternatives in materials selection.

11E. Fibers and Textiles

PAT-APPL-6-219 569 PC **A02**/MF **A01**
Department of Agriculture, Washington, DC.
Apparatus for Treatment of Fibers with Ozone-Steam Mixtures.
Patent Application,
Walter J. Thorsen. Filed 22 Dec 80, 15p PB81-162273
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Fibers are treated with ozone-steam mixtures by conveying them through an open-ended chamber having a horizontal middle section substantially elevated with respect to the open chamber end. The fibers are exposed to the ozone-steam mixture in the horizontal middle section wherein the ozone is centrally introduced. An apparatus for carrying out this method includes an open-ended chamber having a horizontal middle section substantially elevated with respect to the open chamber end. Also included are means for moving the substances through the chamber, means for centrally supplying ozone to the horizontal middle region of the chamber and means for supplying steam to the horizontal middle region of the chamber.

11F. Metallurgy and Metallography

AD-A094 963/6 PC **A04**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
Study of Residual Stresses and Distortion in Structural Weldments in High-Strength Steels.
Technical progress rept. no. 2,
Vassilios J. Papazoglou, and Koichi Masubuchi. 30 Nov 80, 73p
Contract N00014-75-C-0469

Experimental results on temperature, strain, and distortion during welding HY-130 steel are presented. The geometries include 1 inch thick plates and

0.75 inch cylindrical shells. Welding was performed using the gas metal arc, electron beam and laser processes. The experimental results are compared with predictions made by computer programs. Finally, through thickness distributions of residual stresses obtained using the Rosenthal-Norton sectioning technique are presented. (Author)

AD-A095 015/4 PC **A02**/MF **A01**
Materials Research Labs., Ascot Vale (Australia).
An Aspect of the Internal Corrosion of DEFA Cases.
Technical note,
Peter J. Knuckey, and Jeffrey J. Batten. May 80, 17p Rept no. MRL-TN-440
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

The internal corrosion of zinc-plated steel DEFA cases was due to reaction between the zinc coating and internally derived nitric and formic acids in the vapour phase. These gave the corrosion products basic zinc nitrate and zinc formate. The predominance of formate in the outermost layers of the corrosion product and of nitrate in the lower layers suggests that corrosion processes changed at one stage. This was presumably associated with changes in the relative amounts of the two corrodents with time. These observations are in conformity with the products formed during the thermal decomposition of nitrocellulose. These products include nitrogen dioxide, water, and formaldehyde, where nitrogen dioxide is observed in the early stages of the reaction but disappears as the reaction proceeds. Formaldehyde, on the other hand, appears to build-up to a steady concentration. The corrodent nitric acid is explained by the presence of the products nitrogen dioxide and water, while formic acid could arise from the oxidation of formaldehyde by nitrogen dioxide. (Author)

AD-A095 094/9 PC **A02**/MF **A01**
Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.
Microstructural Development and Evolution during Liquid Phase Sintering.
Rept. no. 1 (Final) 1 Oct 77-31 Dec 80,
T. H. Courtney, and J. K. Lee. 25 Jan 81, 25p ARO-14573.7-MS
Contract DAAG29-79-C-0153, Grant DAAG29-77-G-0235

Microstructural development and evolution during the liquid phase sintering process has been studied in terms of thermodynamic, kinetic and structural features. Solid phase contiguity primarily depends on solid volume fraction. Microstructural scale is adversely affected by contiguity since, under this condition, coarsening is accelerated by particle coalescence. It is found that contiguity can be expressed as a single function of particle volume fraction and microstructural scale can be adequately related to system parameters as well as particle volume fraction. (Author)

AD-A095 150/9 PC **A02**/MF **A01**
Drexel Univ., Philadelphia, PA. Dept. of Materials Engineering.
Adiabatic Shearing in Ferrous Alloys.
Final rept.,
H. C. Rogers. 1 Jan 81, 17p ARO-14651.1-MS
Contract DAAG29-79-C-0105, Grant DAAG29-77-G-0137

The dynamic deformation studies were carried out using a modified compressed air gun at Drexel University. The flat-nosed projectiles were made of hardened tool steel approximately 0.6 inches in diameter and weighing about 0.25 lb. For the most part the projectiles were 'stepped'. In other words, the actual penetration attempt of the plate targets was made by a short cylindrical flat-nosed step at the front of the projectile. This step gave the relatively heavy projectile a better chance of penetrating the target at the relatively low velocities that could be generated by the air gun. It also limited the penetration to the height of the step or less. The targets were 1/4 inch to 5/16 inch plates, cut either from plate material of that thickness or removed from 1 inch rounds, depending on availability. Preliminary tests showed that for the materials studied there is no significant orientation effect relative to the direction of working of the target material. (Author)

AD-A095 173/1 PC **A03**/MF **A01**
Weidlinger Associates, New York.
Numerical Studies of Tension Models: Instantaneous Fracture, Plastic Failure, Rate-Dependent Damage Accumulation.
Interim rept. 20 Oct 76-1 Jul 78,
Lorraine Whitman, and Joseph P. Wright. 1 Jul 78, 40p DNA-5330Z
Contract DNA001-77-C-0035

As part of a continuing study of tension models for ground shock calculations, two rate-independent models (instantaneous fracture and plastic failure) are re-examined. Neither model combines the two desired traits of stability-uniqueness and physical realism. Instead, a modified rate-dependent model is proposed for brittle tensile failure in ground shock calculations. It is based on the ductile damage accumulation equations advanced at SRI and Sandia, but in simplified, fully incremental form. Preliminary uniaxial strain calculations show the model to give physically realistic results, close to the predictions of the more complicated rate-dependent model BFRACT. Further testing of the model for more realistic two dimensional problems and an analysis of cost versus benefit is in progress.

DOE/ER/10367-3 PC **A02**/MF **A01**
Lehigh Univ., Bethlehem, PA. Inst. for Metal Forming.
Technical Report on Manufacture of Nb sub 3 Sn Superconducting Wire by Cold Hydrostatic Extrusion.
B. Avitzur, Y. T. Chou, V. Thadani, and T. S. Luhman. 1979, 23p
Contract AC02-79ER10367

Results indicate that the superconducting properties of Nb sub 3 Sn wires could be improved by the use of hydrostatic extrusion. Billets with varying ratio of core to sleeve radius are being hydrostatically extruded and will be tested. The measured data will be compared with conventionally drawn wires. (ERA citation 06:007960)

HEDL-TME-80-71 PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Fatigue-Crack Growth Behavior in Ferritic Alloys for Potential GCFR Structural Applications.
L. A. James. Dec 80, 31p
Contract AC14-76FF02170

The fatigue-crack growth behavior of two ferritic steels (Modified 9Cr-1Mo and HT-9) was studied over the temperature range 24 to 538 exp 0 C. Results from a previous study are also included for a 2-1/4Cr-1Mo steel tested under identical conditions. In general, crack growth rates increased with increasing temperature, but at a given temperature, there was little or no difference in the behavior of any of the three alloys. Little effect of crack orientation was also noted at any of the test temperatures. 7 figures, 5 tables. (ERA citation 06:006261)

IS-M-291 PC **A02**/MF **A01**
Ames Lab., IA.
Preparation and Properties of In-Situ Prepared Filamentary Nb sub 3 Sn-Cu Superconducting Wire.
D. K. Finnemore, J. D. Verhoeven, E. D. Gibson, and J. E. Ostenson. 1980, 12p CONF-800587-6
Contract W-7405-ENG-82
International cryogenic materials conference, Upton, NY, USA, 28 May 1980.

Work at the Ames Laboratory on the in-situ process for preparing Cu-Nb-Sn superconducting wire is reviewed. The results of this work show that consumable arc casting appears to provide a low cost and reliable method for preparing dendritic Cu-Nb alloys suitable for the large scale production of superconducting wire. Casting procedures for 5 cm dia billets were studied and good performance characteristics were found. In addition, preliminary results with 10 cm dia castings look promising and scale up to this size seems likely to be successful. The major problem in scaling up may be to keep the dendrite size large enough to prevent excessive coarsening. The new methods for Sn introduction were developed, a single core process for small diameter wire and a multicore process for large diameter wire. The overall J/sub c/ and strain performance characteristics are well suited to large scale dc magnets in the 8 to 14 tesla range. The ac losses in these materials in the 0 to 3T range are approximately equivalent to continuous filament wire with a filament dia of 40 mu m. Twisting of the wire gives a substantial improvement in the ac losses but the addition of Ni to decouple the fibers does not look encouraging because an immiscibility occurs near 3% Ni. The proximity effect coupling of the fibers will decrease substantially with increasing magnetic fields so this contribution to the ac losses should be much lower at large mu sub 0 H. (ERA citation 06:006358)

IS-M-303 PC **A02**/MF **A01**
Ames Lab., IA.
Magnetic and Crystallization Behavior of Be-Substituted Fe sub 82 B sub 18 Metallic Glasses.
C. S. Severin, and C. W. Chen. 1980, 10p CONF-801134-12
Contract W-7405-ENG-82
26. annual conference on magnetism and magnetic metals, Dallas, TX, USA, 11 Nov 1980.

Substitution of Be for B in the amorphous binary alloy Fe sub 82 B sub 18 was observed to cause an initial increase in saturation magnetization (M/sub s/) to a maximum of 200 emu/g at 4.2K, followed by a decrease for alloys with more than 4 at % Be. Meanwhile, the Curie temperature of the Fe sub 82 B/sub 18-y/ Be/sub y/ alloys decreased progressively with the Be content. These changes in M/sub s/ and T/sub C/ differ from those observed in the Fe-B-M' metallic glasses, where M' is another metalloid (P, C, Si or Ge). Results from Auger electron spectroscopy and Moessbauer experiments confirmed the reversal trend detected in the magnetization measurements. Combining all these results enables us to attribute the initial increase in M/sub s/ to a smaller charge transfer from the Be atoms than that from the B atoms to Fe and the subsequent decrease in M/sub s/ to a possible clustering of the Be atoms at higher concentrations. The annealing behavior for the present alloys is described in terms of crystallization stages and the phases formed. (ERA citation 06:007964)

LBL-11239 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Development of a High Strength, Hydrogen-Resistant Austenitic Alloy.
K. M. Chang, D. H. Klahn, and J. W. Morris, Jr. Aug 80, 10p CONF-800850-4
Contract W-7405-ENG-48
International conference on effects of hydrogen on materials, Jackson Lake Lodge, WY, USA, 26 Aug 1980.

Research toward high-strength, high toughness nonmagnetic steels for use in the retaining rings of large electrical generators led to the development of a Ta-modified iron-based superalloy (Fe-36 Ni-3 Ti-3 Ta-0.5 Al-1.3 Mo-0.3 V-0.01 B) which combines high strength with good toughness after suitable aging. The alloy did, however, show some degradation in fatigue resistance in gaseous hydrogen. This sensitivity was associated with a deformation-induced martensitic transformation near the fracture surface. The addition of a small amount of chromium to the alloy suppressed the martensite transformation and led to a marked improvement in hydrogen resistance. (ERA citation 06:006264)

N81-16133/3 PC **A02**/MF **A01**
Pennsylvania State Univ., University Park.
Study and Modification of the Reactivity of Carbon Fibers.
Final Report.
P. L. Walker, Jr., I. M. Ismail, O. P. Mahajan, and T. A. Eapen. 1 Feb 80, 20p NASA-CR-163883, FR-1
Contracts NAS7-100, JPL-955236
Prepared for JPL.

The reactivity to air of polyactylonitrile-based carbon fiber cloth was enhanced by the addition of metals to the cloth. The cloth was oxidized in 54 wt% nitric acid in order to increase the surface area of the cloth and to add carbonyl groups to the surface. Metal addition was then achieved by soaking the cloth in metal acetate solution to effect

exchange between the metal carbon and hydrogen on the carbonyl groups. The addition of potassium, sodium, calcium and barium enhanced fiber cloth reactivity to air at 573 K. Extended studies using potassium addition showed that success in enhancing fiber cloth reactivity to air depends on: extent of cloth oxidation in nitric acid, time of exchange in potassium acetate solution and the thoroughness of removing metal acetate from the fiber pore structure following exchange. Cloth reactivity increases essentially linearly with increase in potassium addition via exchange.

N81-16210/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Effects of Erodant Particle Shape and Various Heat Treatments on Erosion Resistance of Plain Carbon Steel.
J. Salik, and D. H. Buckley. Jan 81, 10p NASA-TP-1755, E-326

Erosion tests were conducted on 1045 steel samples which had been subjected to different heat treatments. The weight of material removed upon erosion with glass beads and crushed glass was measured. The data show that there is no correlation between hardness and erosion resistance. The erosion rate was strongly dependent on the shape of erodant particles, being an order of magnitude higher for erosion with crushed glass than with glass beads. Heat treatment had a profound effect on the erosion resistance when the erodant particles were glass beads but little or no effect when the particles were crushed glass. It is thus concluded that different mechanisms of material removal are involved with these two erodants. This conclusion is supported by the surface morphology of annealed 1045 steel samples which had been eroded by these two types of erodant particles. SEM micrographs of the eroded surfaces show that for erosion with glass beads it is deformation induced fracture of surface layers.

N81-16211/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
The Effects of Trace Impurities in Coal-Derived Liquid Fuels on Deposition and Accelerated High Temperature Corrosion of Cast Superalloys.
C. E. Lowell, D. J. Deadmore, G. J. Santoro, and F. J. Kohl. 1981, 19p NASA-TM-81678, DOE/NASA/2593-22
Contract EF-77-A-01-2593
Presented at the 26TH Ann. Intern. Gas Turbine Conf., Houston, Tex., 8-12 Mar. 1981; Sponsored by Asme.

The effects of trace metal impurities in coal-derived liquids on deposition, high temperature corrosion and fouling were examined. Alloys were burner rig tested from 800 to 1100 C and corrosion was evaluated as a function of potential impurities. Actual and doped fuel test were used to define an empirical life prediction equation. An evaluation of inhibitors to reduce or eliminate accelerated corrosion was made. Barium and strontium were found to limit attack. Intermittent application of the inhibitors or silicon additions were found to be effective techniques for controlling deposition without losing the inhibitor benefits. A computer program was used to predict the dew points and compositions of deposits. These predictions were confirmed in deposition test. The potential for such deposits to plug cooling holes of turbine airfoils was evaluated. Tests indicated that, while a potential problem exists, it strongly depended on minor impurity variations.

N81-16212/5 PC **A13**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Microstructure of AL2O3 Scales Formed on Nicral Alloys.
Ph.D. Thesis - Case Western Reserve Univ.
J. L. Smialek. Jan 81, 287p NASA-TM-81676, E-664

The structure of transient scales formed on pure and Y or Zr-doped Ni-15Cr-13Al alloys oxidized for 0.1 hr at 1100 C was studied by the use of transmission electron microscopy. Crystallographically oriented scales were found on all three alloys, but especially for the Zr-doped NiCrAl. The oriented scales consisted of alpha-(Al,Cr)2O3, Ni(Al,Cr)2O4 and gamma-Al2O3. They were often found in intimate contact with each other such that the close-packed planes and directions of one oxide phase were aligned with those of another. The prominent structural features of the oriented scales were approximately equal to micrometer subgrains; voids, antiphase domain boundaries and aligned precipitates were also prevalent. Randomly oriented alpha-Al2O3 was also found and was the only oxide ever observed at the immediate oxide metal interface. These approximately 0.15 micrometer grains were populated by intragranular voids which decreased in size and number towards the oxide metal interface. A sequence of oxidation was proposed in which the composition of the growing scale changed from oriented oxides rich in Ni and Cr to oriented oxides rich in Al. At the same time the structure changed from cubic spinels to hexagonal corundums with apparent precipitates of one phase in the matrix of the other. Eventually randomly oriented pure alpha-Al2O3 formed as the stable oxide with an abrupt transition: there was no gradual loss of orientation, no gradual compositional change or no gradual decrease in precipitate density.

PB81-153298 Not available NTIS
National Bureau of Standards, Washington, DC.
Energy Dispersive XRF Composition Profiling Using Crystal Collimated Incident Radiation.
Final rept.,
W. J. Boettinger, H. E. Burdette, and M. Kuriyama. 1980, 9p
Sponsored in part by National Aeronautics and Space Administration, Washington, DC.
Pub. in Proceedings of Conference on Advances in X-ray Analysis, Denver, CO., July 30-August 3, 1979, Paper in Advances in X-ray Analysis 23, p209-217 1980.

In order to measure changes in composition as a function of distance (macrosegregation) in directionally solidified two phase samples, a well collimated incident x-ray beam is required for XRF analysis. This is accomplished using Bragg diffraction of AgKalpha radiation from a highly perfect Si crystal. Because the incident beam is also monochromatic, additional advantages are realized: (a) the backgrounds caused by Compton and thermal diffuse scattering (TDS) of the incident beam are well localized in the energy spectrum and do not interfere with the fluorescent peaks, (b) the TDS can be used as a monitor of the incident photon flux and hence eliminates often substantial errors caused by incident beam intensity fluctuations.

PB81-155640 Not available NTIS
National Bureau of Standards, Washington, DC.
Microstructural Changes in Copper Due to Abrasive, Dry, and Lubricated Wear.
Final rept.,
L. K. Ives. 1979, 3p
Pub. in International Conference on Wear of Materials, Dearborn, MI., April 16-18, 1979, p246-255 1979.

Copper was exposed to wear under conditions of abrasive, dry, and lubricated sliding contact in air. An examination of surface morphology and subsurface microstructure was conducted by scanning and transmission electron microscopy methods in order to study the detailed nature of the wear process on a microscopic level. Wear debris fragments were also examined and the results correlated with surface and subsurface observations.

PB81-155673 Not available NTIS
National Bureau of Standards, Washington, DC.
Electron Microscopy Studies of Wear in Copper.
Final rept.,
L. K. Ives. 1979, 5p
Pub. in Proceedings of the Annual EMSA Meeting (37th), San Antonio, TX., August 13-17, 1979, p452-543 1979.

Electron microscopy studies were conducted on copper surfaces worn under conditions of lubricated and non-lubricated sliding against solid contacts, sliding against abrasive sand (SiO2) particles, and solid particle erosion by Al2O3 particles. Topographic and subsurface microstructural features associated with the various wear modes are described. In all cases, the high contact stresses and accompanying strains led to the development of a layer of fine polycrystalline grains at the surface. This layer extended to a depth of a few micrometers below the surface. At greater depths, a dislocation cell structure was observed. Deformation twins were found near the surface of specimens worn by solid particle erosion. Embedment of abrasive particle fragments in the surface was characteristic of both the abrasive and erosive types of wear.

PB81-155681 Not available NTIS
National Bureau of Standards, Washington, DC.
Discussion of the Paper 'The Study of Fatigue Mechanisms with Electron Channeling'.
Final rept.,
B. Ditchek, and A. W. Ruff. 1979, 7p
Pub. in ASTM Symposium, Kansas City, MO., May 22-23, 1978, Discussion in American Society for Testing and Materials, Special Technical Publication 675, p269-275 1979.

A publication by D. Davidson on fatigue of alloys is reviewed. Comments are made on the selected area electron channeling method applied in this study, along with suggestions for further improvement in the application.

PB81-155806 Not available NTIS
National Bureau of Standards, Washington, DC.
Soils and Underground Corrosion.
Final rept.,
E. Escalante. 1979, 23p
Sponsored in part by American Iron and Steel Inst., Washington, DC.
Pub. in Proceedings of the Annual Liberty Bell Corrosion Course (17th), Philadelphia, PA., September 19-21, 1979.

The effect of the soil environment on underground corrosion is often not given sufficient consideration in engineering design. This may be a consequence of the lack of soil data necessary for a soil corrosivity evaluation. This paper will deal with measurements for soil characterization, galvanic currents, improper material selection and how these affect the corrosion of metals underground.

PB81-156770 PC **A08**/MF **A01**
California State Dept. of Transportation, Sacramento. Office of Transportation Lab.
Fracture Toughness of Structural Grade Bridge Steels. Part II.
Final rept.,
C. B. Kendrick, R. D. Smith, and W. F. Crozier. Apr 80, 171p TL-636708, FHWA/CA/TL-80/11
Portions of this document are not fully legible.

This project was performed to determine how brittle fracture resistances of bridge steels vary with loading rate. Critical stress intensities of four ASTM A36 and A441 steels were measured at 32 F at impact loading rates with instrumented Charpy impact tests and at bridge and slow loading rates with 2-inch compact tension tests performed with a cyclic minor load superimposed on the test load. Methods were developed to estimate the minimum critical stress intensity for ductile fracture, and the impact test values and temperatures required to assure this property.

PB81-803678 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Boiler Corrosion. 1964-October, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Oct 80.
Feb 81, 177p
Supersedes PB80-800527, and NTIS/PS-78/0993.

Federally-funded research on design, efficiency, materials, cathodic protection, corrosion inhibiting additives, and combustion in coal and fuel oil fired boilers is cited. Studies on limestone injection for pollution control and its effect on boiler corrosion are included. The research also covers boilers in magnetohydrodynamic power generation, ships, and nuclear power plants. (This updated bibliography contains 172 citations, 11 of which are new entries to the previous edition.)

PB81-803686 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.

Boiler Corrosion. 1977-September, 1979 (Citations from the Engineering Index Data Base).
Rept. for 1977-Sep 79.
Feb 81, 306p

Worldwide research on materials, fuel types, fuel impurities, additives, efficiency, inhibitory, and combustion is cited. Boiler corrosion studies related to pollution control, feedwater treatment, testing, and boiler design are also included. (This updated bibliography contains 301 abstracts, none of which are new entries to the previous edition.).

PB81-803694 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Boiler Corrosion. October, 1979-January, 1981 (Citations from the Engineering Index Data Base).
Rept. for Oct 79-Jan 81.
Feb 81, 158p
Supersedes PB80-800535, and NTIS/PS-78/0995. See also 1973-1974, NTIS/PS-76/0603 and 1975-1976, NTIS/PS-78/0994.

Worldwide research on materials, fuel types, fuel impurities, additives, efficiency, inhibitors, and combustion is cited. Boiler corrosion studies related to pollution control, feedwater treatment, testing, and boiler design are also included. (This updated bibliography contains 153 citations, All of which are new entries to the previous edition.)

PB81-803991 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Stress Corrosion of Steel. 1964-January, 1981 (Citations from the NTIS Data Base.)
Rept. for 1964-Jan 81.
Feb 81, 356p
Supersedes PB80-803729, and NTIS/PS-78/1318.

The citations cover crack propagation, fracture, tests, surface finishing, working, coatings, deformation, and fatigue in relation to stress corrosion. The majority of studies in this report are on nuclear reactor, aircraft, and spacecraft materials. Stainless steel stress corrosion is excluded. (This updated bibliography contains 349 citations, 50 of which are new entries to the previous edition.)

PB81-858912 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Amorphous Alloys: Iron Base. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 223p NERACASMNT3131

This retrospective bibliography cites reports relating to the properties of amorphous alloys where iron is the major constituent. Emphasis is placed on magnetic properties of those alloys as well as electrical resistivity. Aspects of corrosion resistance, structure, and alloy stability are also addressed. (Contains 269 citations, fully indexed and including a table of contents.)

PB81-858920 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Amorphous Alloys: Nickel Base. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 113p NERACASMNT3133

This retrospective bibliography cites reports relating to the properties of amorphous alloys where nickel is the major constituent. Emphasis is placed on magnetic properties of these alloys as well as electrical resistivity. Aspects of corrosion resistance, structure, and alloy stability are also addressed. (Contains 127 citations, fully indexed and including a table of contents.)

PB81-858938 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Amorphous Alloys: Cobalt Base. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Jan 81, 102p NERACASMNT3132

This retrospective bibliography cites reports relating to the properties of amorphous alloys where cobalt is the major constituent. Emphasis is placed on magnetic properties of these alloys as well as electrical resistivity. Aspects of corrosion resistance, structure, and alloy stability are also addressed. (Contains 115 citations, fully indexed and including a table of contents.)

PB81-859597 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Blast Furnace Chemistry. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Feb 81, 140p NERACASMNT3155

This retrospective bibliography cites reports which relate to the chemistry of blast furnace operations. The effects of a variety of metals on blast furnace operations, including sintering, phase relationships and slag formation, are included. Emphasis is placed on desulfurization of ores. (Contains 251 citations, fully indexed and including a table of contents.)

PB81-859613 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Blast Furnace Gas. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Feb 81, 104p NERACASMNT3156

This retrospective bibliography contains citations concerning blast furnace gases and their chemistry related to efficient conversion of coke and iron oxides to iron. Also included are topics related to top gas recycling for more efficient operation of the refining process. (Contains 162 citations, fully indexed and including a table of contents.)

PB81-859852 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Hydrometallurgy Techniques and Processes. January, 1970-January, 1981 (Citations from the NTIS Data Base).
Rept. for Jan 70-Jan 81.
Jan 81, 117p NERACUSGNT1833

This bibliography cites reports relating to different techniques of hydrometallurgy for ores and alloys. The separation of fission products is also included. (Contains 102 citations, fully indexed and including a table of contents.)

SAND-80-1441C PC **A02**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Thermal Stress Relieving of Dilute Uranium Alloys.
K. H. Eckelmeyer. 1980, 16p CONF-801061-5
Contract AC04-76DP00789
Conference on high density penetration materials, Charlottesville, VA, USA, 28 Oct 1980.

The kinetics of thermal stress relieving of uranium - 2.3 wt. % niobium, uranium - 2.0 wt. % molybdenum, and uranium - 0.75 wt. % titanium are reported and discussed. Two temperature regimes of stress relieving are observed. In the low temperature regime (T < 300 exp 0 C) the process appears to be controlled by an athermal microplasticity mechanism which can be completely suppressed by prior age hardening. In the high temperature regime (300 exp 0 C < T < 550 exp 0 C) the process appears to be controlled by a classical diffusional creep mechanism which is strongly dependent on temperature and time. Stress relieving is accelerated in cases where it occurs simultaneously with age hardening. The potential danger of residual stress induced stress corrosion cracking of uranium alloys is discussed. It is shown that the residual stress relief which accompanies age hardening of uranium - 0.75% titanium more than compensates for the reduction in K/sub ISCC/ caused by aging. As a result, age hardening actually decreases the susceptibility of this alloy to residual stress induced stress corrosion cracking. (ERA citation 06:006265)

11G. Miscellaneous Materials

LBL-10862 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Thin Film Electrochromic Materials for Energy Efficient Windows.
C. M. Lampert. Oct 80, 47p EEB-W-80-10
Contract W-7405-ENG-48

Numerous inorganic and organic electrochromic materials are discussed in the context of developing a thin film energy efficient window. By use of electrochromic thin films, it is possible electronically to control transmission or reflection properties of a window, thus allowing it to be optically and thermally managed, thereby reducing space heating and cooling load. The properties of transition metal oxides, such as WO sub 3 , MoO sub 3 , Ir sub 2 O sub 3 , and V sub 2 O sub 5 are detailed. Organic systems such as Heptyl Viologen, Polytungsten anion are reviewed. Also, intercalated structures are discussed. The designs of working devices are outlined. From this quantification, materials, devices, and appropriate deposition technology are selected for window applications. (ERA citation 06:007879)

11H. Oils, Lubricants, and Hydraulic Fluids

AD-A094 685/5 PC **A03**/MF **A01**
Foxboro Analytical, Burlington, MA.
Real Time Ferrograph Development.
Final rept.,
E. Roderic Bowen. Nov 79, 38p Rept no. 80015
Contract N000140-76-C-0713

The intent of this project was to develop an instrument capable of measuring the concentration of ferromagnetic wear debris in the lubricant of a jet engine. The instrument was to be an online device that would operate satisfactorily in an airborne environment.

AD-A094 900/8 PC **A08**/MF **A01**
Southwest Research Inst., San Antonio, TX. Army Fuels and Lubricants Research Lab.
Lubricants for Combating Effects of High-Sulfur Fuel.
Interim rept.,
Edwin A. Frame. Jul 80, 154p Rept no. AFLRL-127
Contracts DAAK70-80-C-0001, DAAK70-78-C-0001

Six lubricants were evaluated for their effectiveness in controlling the deleterious effects of using high-sulfur diesel fuel. Two lubricants were identified which have potential to substantially reduce deleterious effects when operating on high-sulfur fuel. A supplemental oil additive used in preservative engine oils was evaluated in three different lubricants with high-sulfur fuel. (Author)

AD-A094 902/4 PC **A03**/MF **A01**
Southwest Research Inst., San Antonio, TX. Army Fuels and Lubricants Research Lab.
Fuel Lubricity--Survey of the Literature.
Special rept.,
J. C. Tyler, and J. P. Cuellar, Jr. Jan 81, 49p Rept no. AFLRL-136/MED121
Contracts DAAK70-80-C-0001, N00140-80-C-2269

This report presents the findings of a literature survey on the general topic of fuel lubricity. The conclusions advanced by many investigators, based on their studies since the mid-1960's, are presented. From the survey, the authors have drawn several conclusions which are also presented in the report. A list of 35 references and an annotated bibliography are provided. (Author)

N81-16475/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Huntsville, AL. George C. Marshall Space Flight Center.
An Evaluation of Grease Type Ball Bearing Lubricants Operating in Various Environments.
Status Report No. 5.

E. L. Mcmurtrey. Jan 81, 24p NASA-TM-82391, SR-5

Because many future spacecraft or space stations will require mechanisms to operate for long periods of time in environments which are adverse to most bearing lubricants, a series of tests is continuing to evaluate 38 grease type lubricants in R-4 size bearings in five different environments for a 1 year period. Four repetitions of each test are made to provide statistical samples. These tests were used to select four lubricants for 5 year tests in selected environments with five repetitions of each test for statistical samples. At the present time, 100 test sets are completed and 22 test sets are underway. Three 5 year tests were started in (1) continuous operation and (2) start-stop operation, with both in vacuum at ambient temperatures, and (3) continuous operation at 93.3 C. In the 1 year tests the best results to date in all environments were obtained with a high viscosity index perfluoroalkylpolyether (PFPE) grease.

11I. Plastics

AD-A094 847/1 PC **A11**/MF **A01**
Dayton Univ., OH. Research Inst.
Polymeric Material Testing Procedures to Determine Damping Properties and the Results of Selected Commercial Materials.
Technical rept. 15 Jan 76-31 Dec 79,
Michael L. Drake, and Gary E. Terborg. Jul 80, 234p UDR-TR-80-40, AFWAL-TR-80-4093
Contract F33615-76-C-5137

This report contains a detailed discussion of the methods and procedures used to determine the damping properties of commercially available polymeric materials. All the data from the testing is contained in the Appendices, which include the bare beam results, the coated beam results, and the temperature nomogram for each material tested.

11J. Rubbers

AD-A094 750/7 PC **A02**/MF **A01**
Akron Univ., OH. Inst. of Polymer Science.
Effect of Interfacial Bonding on the Strength of Adhesion of Elastomers II. Dissimilar Adherends.
Technical rept.,
R. -J. Chang, and A. N. Gent. 2 Feb 81, 24p
Rept no. TR-10
Contract N0014-76-C-0408
See also report dated Jan 81, AD-A094 756.

Two elastomer layers, differing either in initial degree of crosslinking or in chemical reactivity, were bonded together by a free-radical crosslinking process. The elastomers employed were polybutadiene (BR) and an ethylene-propylene copolymer (EPR), differing in the efficiency of crosslinking by dicumyl peroxide by a factor of about 20. When a fully-crosslinked sheet of either elastomer was pressed into contact with a partially-crosslinked sheet of the same elastomer and the crosslinking then taken to completion, the strength of adhesion under threshold conditions was found to be qualitatively in accord with the predictions of a simple theoretical treatment for the degree of interlinking in terms of the corresponding homogeneous crosslinking reaction. Whereas the theory suggests that the effective degree of interlinking will be one-half of that generated in a homogeneous system, the experimental results were in accord with a figure of about 70 per cent. When a layer of one elastomer was bonded to a layer of the other in a similar way, the strength of adhesion was found to be relatively high when the initial fully-crosslinked layer was BR and relatively low when it was EPR. These results were also in qualitative agreement with theoretical predictions for the degree of chemical interlinking developed between layers differing in chemical reactivity. Thus a general correlation appears to hold between the threshold strength of adhesion and the amount of interlinking. (Author)

AD-A094 756/4 PC **A04**/MF **A01**
Akron Univ., OH. Inst. of Polymer Science.
Effect of Interfacial Bonding on the Strength of Adhesion of Elastomers, I. Self-Adhesion.
Technical rept.,
R. -J. Chang, and A. N. Gent. 30 Jan 81, 51p
Rept no. TR-9
Contract N00014-76-C-0408
See also AD-A094 750.

Two partially-gelled (crosslinked) layers of elastomer were pressed into intimate contact and the gelation reaction was then taken to completion. By varying the extent of initial gelation, the degree of chemical interlinking was varied from zero, when two fully-reacted sheets were pressed together, up to a level characteristic of the final density of molecular linking within each layer, when they were brought together before any reaction had occurred. The strength of adhesion between the layers was measured under threshold conditions, i.e., at low rates of peel, at high temperatures, and, in some instances, with the layers swollen with a compatible liquid. Linear relations were obtained between the threshold work of detachment per unit of interfacial area and the amount of chemical interlinking, deduced from the kinetics of molecular linking within each layer. At any degree of interlinking, ranging from zero to the fully interlinked state, the work of detachment was lower for networks composed of shorter molecular chains, in accordance with the Lake-Thomas theory of the threshold strength of elastomer networks. By extrapolation to the fully-interlinked state, the strength of adhesion corresponding to cohesive rupture was inferred. These values agreed with measured tear strengths for polybutadiene gelled by a free-radical process. For a sulfur crosslinking system, and for both free-radical and sulfur crosslinking of poly(ethylene-co-propylene), the threshold tear strength of the elastomer was found to be much higher than the extrapolated value from adhesion measurements.

11L. Wood and Paper Products

PB81-801268 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Pollution and Its Control in the Paper and Pulp Industry. 1976-November, 1980 (Citations from the NTIS Data Base).
Rept. for 1976-Nov 80.
Dec 80, 200p
Supersedes PB80-801566, and NTIS/PS-78/1037. See also 1964-1975, NTIS/PS-78/1036, and 1976-November 1980, PB81-801268.

The cited reports of Federally-funded research cover various aspects of pollution and pollution control in the paper and pulp industry. Topics include control techniques, types of wastes, control costs, pollution effects on the environment, and the socioeconomic factors of pollution and pollution control. (This updated bibliography contains 191 citations, 42 of which are new entries to the previous edition.)

PB81-801276 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Pollution and Its Control in the Paper and Pulp Industry. 1978-November, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1978-Nov 80.
Dec 80, 133p
Supersedes PB80-801582, and NTIS/PS-78/1038. See also 1970-1974, NTIS/PS-76/0806, 1975-1977, PB80-801574, and 1978-November 1980, PB81-801276.

The cited reports from a worldwide literature survey discuss air, water, and solid waste pollution from the pulp and paper industry. Economics, ways to recycle effluents, cost estimates, types of waste, detection, socioeconomic factors, and the effects of the pollution on the environment are discussed. (This updated bibliography contains 124 citations, 52 of which are new entries to the previous edition.)

12.

MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

AD-A094 653/3 PC **A03**/MF **A01**
Armstrong (Philip N)., Santa Ana, CA.
Sparse Matrix Computations with a Special Array-Processor.
Final technical rept.,
Philip N. Armstrong, and David G. Cantor. 15 Dec 80, 33p
Contract N00014-79-C-0477

This is the final report of a study of special computing machinery for computations on sparse matrices. The elements of the computing system and its application to Gaussian elimination are described in some detail in the paper 'On a Special Purpose Matrix Array-Processor' by Philip N. Armstrong and David G. Cantor, which has been submitted for publication and comprises the major part of this report. This paper describes the system and the algorithms for which it is designed, so that a reader who is acquainted with computations on matrices will understand the system's utility for such computations. Some additional remarks regarding selected matrix computations may be useful and are included, although what is written may be inferred from the substance of the paper. Reading the paper is a prerequisite for these remarks.

AD-A094 726/7 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Some General Principles for the Dual Problem to Statistical Classification.
Technical note,
Lee K. Jones. 26 Nov 80, 28p TN-1980-55, ESD-TR-80-229
Contract F19628-80-C-0002

We consider the design of decision problems which maximize the classification error for a given set of discriminants. A minimax principle is proved, which has applications in discriminant analysis and feature extraction. (Author)

AD-A094 728/3 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
On Nonparametric Probability Density Estimation Using Orthogonal Series.
Technical note,
Lee K. Jones. 26 Nov 80, 15p TN-1980-54, ESD-TR-80-230
Contract F19628-80-C-0002

A method of density estimation is proposed, which is a rational modification of orthogonal expansions, combined with a stopping rule determined by a nearest neighbor statistic. This method yields consistent estimates and applies (in principle) to density estimation in any number of dimensions. (Author)

AD-A094 732/5 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Modified Kolmogorov-Smirnov Test for the Gamma and Weibull Distribution with Unknown Location and Scale Parameters.
Master's thesis,
Ramon Cortes. Dec 80, 113p Rept no. AFIT/GOR/MA/80D-1

The Kolmogorov-Smirnov tables for the Weibull and Gamma distribution were generated in this thesis. These tables are used when testing whether a set of observations are from a Weibull

(Gamma) distribution in which the location and scale parameters must be estimated from the sample. A power investigation of the test against some selected distributions using Monte Carlo techniques was conducted. This procedure shows that the test is reasonably powerful for a number of alternative distributions. A relationship between the critical values and the shape parameters was investigated for the Weibull and Gamma distributions. No apparent relationship was found for the Gamma distribution. In contrast, an approximate log-linear relationship was found for the Weibull when the shape parameter is between one and four. (Author)

AD-A094 743/2 PC **A02**/MF **A01**
Army Missile Command, Redstone Arsenal, AL. Systems Simulation and Development Directorate.
Z-Transform Techniques for Improved Real-Time Digital Simulation of Continuous Systems: Runge-Kutta Convolutions Adjusted for Unit Step Response via Pole-Residues.
Technical rept.,
Richard E. Dickson. 1 Oct 80, 23p DRSMI/RD-81-1-TR, AD-E950 077
Includes errata sheet dated 15 Jan 81.

An approximation for ZG(s)F(s) is developed using the second order Runge-Kutta integrator family. The residue for exact unit step response of a single real pole filter is then developed. The error for a complex exponential into a complex pole is also presented. (Author)

AD-A094 766/3 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Modern Optimal Control Methods Applied in Active Control of a Tetrahedron.
Master's thesis,
Alan Michael Janiszewski. Dec 80, 109p Rept no. AFIT/GS/AA/80D-2

Modern optimal control methods are applied to a lumped mass model of a tetrahedron. The four unit masses of this model are interconnected by isotropic massless rods which are capable of axial deformation only (no bending). System control is achieved via collected sensor/actuator pairs at three of the four masses. The controller is developed using linear optimal techniques which produce feedback gains proportional to the state. The state is represented as modal amplitudes and velocities as determined by the sensors. The four higher frequency modes are truncated to signify a simplifying order reduction step. State estimation is incorporated due to the non-availability of modal amplitudes and velocities. The feedback gains are established via steady state optimal regulator theory. Control is applied with point force actuators. System response is examined in light of the effects of observation spillover and control spillover onto a specified number of suppressed modes. An attempt to control two modes and suppress six demonstrates the advantages of spillover elimination, but fails to satisfy the specified response criteria.

AD-A094 810/9 PC **A10**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Comparison of the Accuracy of Univariate and Bivariate Techniques for Finding the Lower Confidence Limits of System Reliability.
Master's thesis,
Kathleen Mary DePuy. Dec 80, 207p Rept no. AFIT/GOR/OS/80D-2

The purpose of this thesis is to compare the accuracy of two Monte Carlo simulation techniques of finding lower system reliability confidence limits: the bivariate technique and the univariate technique. The actual results compared are the confidence interval coverages of the true system reliability associated with the confidence limits. The bivariate technique is based upon the assumption that the maximum likelihood estimators of the component shape and scale parameters have an asymptotic normal distribution. The univariate technique uses the assumption that the component reliability estimates have a normal distribution. Two variations of the univariate technique are also examined. The first variations assumes that component reliability estimates follow a beta distribution instead of a normal distribution. The second variation replaces all perfect system reliability estimates with new, adjusted reliability values.

AD-A094 833/1 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Modified Double Monte Carlo Technique to Approximate Reliability Confidence Limits of Systems with Components Characterized by the Weibull Distribution.
Master's thesis,
James Ward Johnston, Jr. Dec 80, 74p Rept no. AFIT/GOR/OS/80D-5

A modified Double Monte Carlo technique is developed for determination of lower confidence limits of system reliability based on component test data. It is assumed that the components test data consists of failure times, which are distributed according to a known two-parameter Weibull probability distribution. These failure times are randomly generated using the true shape and scale parameters of the distribution. Maximum-likelihood estimators are twice obtained for the shape and scale parameters and then substituted into the reliability equation to obtain an estimator for the component reliability. A given number of these estimators are obtained and used to form an empirical distribution of reliabilities for each component. A given number of samples from this distribution are used to calculate various system reliabilities. Since the true system reliability is known, it can be determined if a given confidence interval contain the true number, hence giving you a method of validating any confidence interval. (Author)

AD-A094 874/5 PC **A02**/MF **A01**
California Univ., San Diego, La Jolla. Dept. of Chemistry.
Equal-Time Second-Order Moments of a Harmonic Oscillator with Stochastic Frequency and Driving Force,
Katja Lindenberg, V. Seshadri, K. E. Shuler, and Bruce J. West. 17 Dec 79, 12p
Contract N00014-78-C-0497, Grant NSF-CHE78-21460
Pub. in Jnl. of Statistical Physics, v23 n6 p755-765 1980. Prepared in cooperation with La Jolla Inst., CA. Center for Studies of Nonlinear Dynamics.

No abstract available.

AD-A094 878/6 Not available NTIS
Arizona Univ., Tucson.
Multiphase Averaging and the Inverse Spectral Solution of the Korteweg-de Vries Equation,
H. Flaschka, M. G. Forest, and D. W. McLaughlin. Apr 79, 46p
Contract DAAG29-78-C-0059, Grant NSF-MPS75-07530
Prepared in cooperation with Ohio State Univ., Columbus and New York Univ., NY. Courant Inst. of Mathematical Sciences.
Availability: Pub. in Communications on Pure and Applied Mathematics v33 p739-784 1980 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A094 881/0 Not available NTIS
New York Univ., NY. Courant Inst. of Mathematical Sciences.
Radiation Boundary Conditions for Wave-Like Equations,
Alvin Bayliss, and Eli Turkel. Dec 79, 19p
Contract NAS1-14101, Grant AFOSR-76-2881
Availability: Pub. in Communications on Pure and Applied Mathematics, v33 p707-725 1980 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A094 895/0 PC **A03**/MF **A01**
Claremont Men's Coll., CA. Inst. of Decision Science.
Computing Lower Confidence Bounds with the Likelihood Ratio Method.
Technical rept.,
James B. Lucke. Jan 81, 27p Rept no. 81-2
Contract N00014-78-C-0213

Subroutines for computing lower confidence bounds are described that use the properties of the method to compute efficiently and avoid possible pitfalls of computing fixed points. (Author)

AD-A094 899/2 PC **A05**/MF **A01**
School of Aerospace Medicine, Brooks AFB, TX.
On Two-Sided Confidence and Tolerance Limits for Normal Distributions.
Final rept. Jan-May 67,
Alton J. Rahe. Dec 80, 81p Rept no. SAM-TR-80-46

This report gives known theorems on which the concept and construction of confidence and two types of tolerance limits for normal distributions are based. Procedures are presented for computing two-sided confidence and tolerance limits for means and simple linear regression data (simultaneous and nonsimultaneous limits for each type). A numerical simple linear regression example is presented showing the six types of limits. An additional bibliography is given for reference on confidence and tolerance limits when information other than what is given in the report is desired. (Author)

AD-A094 909/9 PC **A03**/MF **A01**
North Carolina Univ. at Chapel Hill.
A Perspective and Proposal for the Initial Transient Problem in Simulation.
Technical rept.,
George S. Fishman. Dec 80, 27p Rept no. TR-80-6
Contract N00014-76-C-0302

This paper presents a perspective on the initial transient problem in steady-state simulation. In particular, it enumerates five generally accepted facts: (1) Conditions prevailing at the beginning of a simulation influence sample paths. (2) The extent of influence is a function of the strength of autocorrelation. (3) Some initial conditions are less detrimental than others are. (4) Truncation reduces bias but usually increases variance. (5) So far no complete solution exists. The remainder of the paper describes a proposal for solving the problem. It relies on the relatively weak assumption that the conditional means in a stochastic process of interest are related linearly. An estimator of the steady-state mean is described which has considerably less bias than one can achieve via conventional truncation. An interval estimator is also described which follows from standard regression theory. A test for residual bias is presented which enables a user to judge whether or not sample data meet the minimal requirements for the proposed technique to apply. A second test allows a user to judge whether or not a more efficient estimation technique can be used. (Author)

AD-A094 980/0 PC **A02**/MF **A01**
North Carolina Univ. at Chapel Hill. Inst. of Statistics.
Asymptotic Properties of Random Subsets of Projective Spaces.
Technical rept.,
Douglas G. Kelly, and James G. Oxley. Dec 80, 25p Rept no. MIMEO SER-1318
Contract N00014-76-C-0550

A random graph on n vertices is a random subgraph of the complete graph on n vertices. By analogy with this, the present paper studies the asymptotic properties of a random submatroid omega(r) of the projective geometry PG(r-1,q). The main result concerns Kr, the rank of the largest projective geometry occurring as a submatroid of omega(r). We show that with probability one, for sufficiently large r, Kr takes one of at most two values depending on r. This theorem is analogous to a result of Bollobas and Erdos on the clique number of a random graph. However, whereas from the matroid theorem one can essentially determine the critical exponent of omega(r), the graph theorem gives only a lower bound on the chromatic number of a random graph. (Author)

AD-A095 013/9 PC **A03**/MF **A01**
Florida Univ., Gainesville. Dept. of Industrial and Systems Engineering.
Acceptance Control Charts with Stipulated Error Probabilities Based on Poisson Count Data.
Research rept.,
Suresh Mhatre, Richard L. Scheaffer, and Richard S. Leavenworth. Dec 80, 33p Rept no. RR-80-9
Contract N00014-75-C-0783

An acceptance control charting scheme is investigated for the case in which observations consist of

the number of nonconformances seen when a process is observed for a certain fixed length of time. The counts are assumed to have a Poisson distribution. Two normal approximations for finding the optimum sample size and control limit are compared to the exact values found through the use of Poisson (or Chi-square) probabilities. Recommendations for practical usage are made as a result of a numerical study. (Author)

AD-A095 024/6 PC **A02**/MF **A01**
Texas Univ. at Austin. Center for Cybernetic Studies.
Minimization by Interpolation: A Second Order Gradient Algorithm.
Research rept.,
Jonathan Barzilai. Nov 80, 8p Rept no. CCS-387
Contract N00014-75-C-0569

Newton's method for finding stationary point has second order of convergence. However, it necessitates computation and inversion of the second order derivatives matrix. We present new classes of algorithms. One of these has second order of convergence while using first order information only.

AD-A095 025/3 PC **A02**/MF **A01**
Texas Univ. at Austin. Center for Cybernetic Studies.
Unconstrained Minimization by Interpolation: Rates of Convergence.
Research rept.,
J. Barzilai. Dec 80, 16p Rept no. CCS-389
Contract N00014-80-C-0242

The main attraction of Newton's method for finding a stationary point is its quadratic convergence. However, it necessitates computation and inversion of the second order derivative matrix. Common minimization algorithms approximate the Hessian or its inverse by first order (i.e., gradient) information. First order information algorithms in common use are known to have at best superlinear rate of convergence. We analyze the rate of convergence of a new class of algorithms based on n-dimensional interpolation. In particular, we present a class of algorithms which use first order information only, while maintaining quadratic convergence.

AD-A095 041/0 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Estimating the Autocorrelated Error Model with Trended Data: Further Results,
Rolla Edward Park, and Bridger M. Mitchell. Nov 79, 39p Rept no. RAND/R-2470

A Monte Carlo study is made of the small sample properties of various estimators of the linear regression model with first-order autocorrelated errors. When independent variables are trended, estimators using T transformed observations (Prais-Winsten) are much more efficient than those using T-1 (Cochrane-Orcutt). The best of the feasible estimators is iterated Prais-Winsten using a sum-of-squared-error minimizing estimate of the autocorrelation coefficient rho. None of the feasible estimators performs well in hypothesis testing; all seriously underestimate standard errors, making estimated coefficients appear to be much more significant than they actually are. (Author)

AD-A095 058/4 PC **A02**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg.
Sequential Tests Under Weibull Distribution.
Technical rept.,
P. M. Ghare. Dec 80, 22p RR-Q-7, ARO-15194.8-M
Grant DAAG29-78-G-0172

The objective of this paper is to develop acceptance procedures based on a sequential probability ratio test when the system failures follow Weibull probability distribution. The acceptance procedures in both Military Handbook 108 and Mil-Std-781C are based on exponential distribution of failures. Exponential distribution implies a constant hazard rate. The Weibull distribution is much more comprehensive and, with suitable choice of parameters, can describe constant, increasing or decreasing hazard rates.

AD-A095 068/3 PC **A04**/MF **A01**
California Univ., Berkeley. Operations Research Center.
Life Distribution Models and Incomplete Data.
Research rept.,
Richard E. Barlow, and Frank Proschan. Sep 80, 59p Rept no. ORC-80-20
Grant AFOSR-77-3179
Prepared in cooperation with Florida State Univ., Tallahassee, FL. Dept. of Statistics.

This report represents the second chapter of a book in preparation on inference and data analysis in reliability and life testing. The point of view adopted differs from that of most books on the subject in the following basic respect: Prior information available to the reliability analyst is utilized fully in a formal statistical fashion. Experience accumulated in helping engineers, quality assurance managers, scientists, biostatisticians, and others who must make estimates and reach decisions from either planned experiments or retrospective data has shown us that the point of view adopted throughout the book has resulted in useful solutions to real-life problems. By contrast, more classical statistical methods have often proven inadequate in many practical problems simply because the data available are insufficient to reach conclusions with a desired degree of assurance. The book is intended primarily for actual use by the engineering and scientific practitioner, rather than for theoretical study and philosophical analysis by the statistician. Thus we omit a philosophical justification of the methods presented; rather, we rely on the fact that they have led to useful answers to problems that have arisen in practice.

AD-A095 077/4 PC **A06**/MF **A01**
Texas A and M Univ., College Station. Inst. of Statistics.
A Quantile Function Approach to the K-Sample Quantile Regression Problem.
Technical rept.,
James Michael White. Nov 80, 119p TR-B-4, ARO-16992.4-M
Contract DAAG29-80-C-0070

A procedure for estimating the parameters of a quantile regression function is investigated. The procedure is based on the work of Parzen (1979a) in the theory of quantile functions and is applicable to a wide range of distributional families. The procedure assumes the quantile functions of k populations to be location-scale shifts of a common quantile function. First, a goodness-of-fit procedure for determining the common distributional shape of the k populations generalizes the one-population data modeling techniques of Parzen (1979a). An estimator of the shape parameter of a distribution is also investigated. The methods of Ogawa (1951) and Eubank (1979) are then used for estimating the location and scale parameters of the k populations. A regression model for the location and scale parameters is specified, and the resulting estimators of the regression parameters are used to determine a regression function for any quantiles of the observed data. Finally it is shown that inferences about the quantile relationships can be based on the asymptotic normality of the estimated parameters. The procedures are applied to some published data sets.

AD-A095 139/2 PC **A03**/MF **A01**
California Univ., Berkeley. Operations Research Center.
On the Consecutive k-of-n System.
Research rept.,
Cyrus Derman, Gerald J. Lieberman, and Sheldon M. Ross. Nov 80, 26p Rept no. ORC-80-25
Grant AFOSR-77-3213

We consider the consecutive k-of-n system in which there are n components linearly ordered. Each component either functions or fails and the system is said to be failed if any k consecutive components are failed. Let r(p) = r(p(1), ..., p(n)) denote the probability that the system does not fail given that the components are independent, component i functions with probability p(i), i = 1, ..., n. The function r(p) is called the reliability function. We study the above system both when the components are linearly ordered and also when they are arranged in a circular order. We consider the case where all p(i) are identical and present a recursion for obtaining the reliability of a consecutive k-of-n in terms of the reliability of a consecutive k - 1 of n system. This yields simple explicit formulas when k is small and differs from a recursion. We show how upper and lower bounds on r(p) can be simply obtained. We consider a dynamic version in which each component independently functions for random time having distribution F. We show that when F is increasing failure rate (IFR), then system lifetime is also IFR only in the circular case when k = 2. We consider a sequential optimization model in the linear k = 2 case. In this model, components are put in place one at a time with complete knowledge as to whether the previous component has worked or not.

COO-2383-0075 PC **A03**/MF **A01**
Illinois Univ. at Urbana-Champaign. Dept. of Computer Science.
Lanczos Biorthogonalization Algorithm and Other Oblique Projection Methods for Solving Large Unsymmetric Systems.
Y. Saad. Dec 80, 48p UIUCDCS-R-80-1036, UILU-ENG-80-1733
Contract AS02-76ER02383

Many powerful methods for solving systems of equations can be regarded as projection methods. Most of the projection methods known for solving linear systems are orthogonal projection methods: but little attention has been given to the class of nonorthogonal (or oblique) projection methods, which is particularly attractive for large nonsymmetric systems. Some methods in the general setting of oblique projection methods are presented, and some theoretical results are given. Some experiments comparing the various algorithms are reported. 5 figures. (ERA citation 06:008507)

PB81-139867 (Order as PB81-139859, PC **A05**/MF **A01**)
Jiangxi Teachers Coll., Nanchang (China).
On the Distortion Theorem of Schlicht Functions,
Hu Ke. 16 Apr 79, 4p
Included in Scientia Sinica, v25 n12 p977-980 Dec 80.

No abstract available.

PB81-139875 (Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Systems Science.
Trace Theorems of the Spaces (W sup 1) (L sup p) (Phi,Omega) and Calculus of Variations with Strong Nonlinearity,
Ding Ziaxi, Luo Peizhu, Fang Huizhong, and Gu Yongeng. 20 Feb 80, 4p
Included in Scientia Sinica, v25 n12 p981-984 Dec 80.

No abstract available.

PB81-159204 (Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Applied Mathematics.
Generating k-Ary Trees in Lexicographic Order,
Zhu Yongjin, and Wang Jianfang. 9 Jun 78, 7p
Included in Scientia Sinica, v23 n10 p1219-1225 Oct 80.

This paper discusses the LI-restricted k-ary trees. The authors represent a k-ary tree by the level numbers of its leaves. Thus every k-ary tree with n leaves corresponds to a sequence of n positive integers. The authors first give the necessary and sufficient conditions for a sequence representing a k-ary tree, and then present an algorithm for generating all the LI-restricted feasible sequences lexicographically as a list.

PB81-159212 (Order as PB81-159196, PC **A07**/MF **A01**)
Sichuan Univ., Chengdu (China). Dept. of Mathematics.
A Family of Fields with Finite Square Class Number,
Li Deland. 19 Aug 78, 11p

Included in Sckientia Sinica, v23 n10 p1226-1236 Oct 80.

In this paper, by studying subfields with finite square class number of p-adic fields, two families of fields are given with the following properties respectively: A. (1) the square class number is 8; (2) the form (x squared) + (y squared) is universal and there exists another universal binary form over the field, which is not equivalent to (x squared) + (y squared); (3) there exists a binary non-universal form over the field. B. (1) The square class number is 8; (2) the field is formally real and has exactly one ordering and all the positive elements are sums of two squares; (3) the only universal binary form over the field (up to equivalence) is x squared - y squared. Thus, it gives the answer in Szymiezek's question about studying classification of fields according to their Witt groups.

PB81-803884 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Integration of Nonlinear Differential Equations. 1970-1980 (Citations from the NTIS Data Base).
Rept. for 1970-80.
Feb 81, 250p
Supersedes PB80-802978, and NTIS/PS-78/1194.

Research is cited on the numerical integration of nonlinear differential equations. Other methods of solution included are variational methods, finite difference methods, Laplace transform techniques, Runge-Kutta methods, and conjugate gradient methods, as are solutions to two point boundary value problems and multipoint boundary value problems. (This updated bibliography contains 241 citations, 34 of which are new entries to the previous edition.)

PB81-858110 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Discrete Fourier Analysis Theory and Applications. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Jan 81, 79p NERACIAANT2953

This retrospective bibliography contains citations concerning theory relating to techniques and applications for Discrete Fourier Analysis. Consideration is given to computations, effectiveness, and properties of Discrete Fourier Analysis as well as methods for generation of Discrete Fourier Transform pairs and relationships between Discrete Fourier Transforms and Fast Fourier Transforms. Applications range from frequency or spectrum analysis and solving linear equations to computing multidimensional convolutions. (Contains 76 citations, fully indexed and including a table of contents.)

PB81-858235 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Walsh Functions. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Jan 81, 144p NERACIAANT3001

This retrospective bibliography contains citations concerning the theory and applications of Walsh Functions to the evaluation, transformation, and solution of equations or functions; to the analysis of networks and circuits; and to information theory, data and image transmission and processing, data compression, pattern recognition, signal processing, spectrum and vector analysis, and multiplexing. (Contains 153 citations, fully indexed and including a table of contents.)

SAND-80-1903 PC **A05**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Rank Correlation Plots for Use with Correlated Input Variables in Simulation Studies.
R. L. Iman, and J. M. Davenport. Nov 80, 79p
Contract AC04-76DP00789

A method for inducing a desired rank correlation matrix on multivariate input vectors for simulation studies has recently been developed by Iman and Conover (SAND 80-0157). The primary intention of this procedure is to produce correlated input variables for use with computer models. Since this procedure is distribution free and allows the exact marginal distributions to remain intact, it can be used with any marginal distributions for which it is reasonable to think in terms of correlation. A series of rank correlation plots based on this procedure when the marginal distributions are normal, lognormal, uniform, and loguniform is presented. These plots provide a convenient tool for both aiding the modeler in determining the degree of dependence among variables (rather than guessing) and communicating with the modeler the effect of different correlation assumptions. 12 figures, 10 tables. (ERA citation 06:008511)

12B. Operations Research

AD-A094 815/8 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Application of Scheduling Heuristics to the Aircraft Maintenance Depot.
Master's thesis,
Joseph William Adams, Jr. Dec 80, 54p Rept no. AFIT/GOR/OS/80D-1

Scheduling heuristics were applied to a model of the aircraft maintenence depot at Warner Robins Air Logistics Center. Since the C-141 aircraft was being overloaded into depot, heuristics which gave the C-141 priority were tested in an effort to reduce the mean and variance of the distribution of times the C-141 aircraft spent at the depot. One heuristic was found which reduced the average depot time by 4%. The significance of this decrease was calculated to be 91%. A similar heuristic reduced the variance by 81%, with a significance of 100%. Thus, the potential exists for improving the flow of the overloaded C-141 aircraft through the depot, using scheduling heuristics. (Author)

AD-A095 022/0 PC **A03**/MF **A01**
Texas Univ. at Austin. Center for Cybernetic Studies.
Nonpolynomial and Inverse Interpolation for Line Search: Synthesis and Convergence Rates.
Research rept.,
J. Barzilai, and A. Ben-Tal. Dec 80, 36p Rept no. CCS-385
Contracts N00014-75-C-0569, N00014-80-C-0242

The rate of convergence of line search algorithms based on general interpolating functions is derived, and is shown to be independent of the particular interpolating function used. This result holds for the root finding problem $f(x) = 0$ as well. We show how inverse interpolation can be used in conjunction with the line search problem, and derive its rate of convergence. Our analysis suggests that one-point line search algorithms (in particular Newton's method) are inefficient in a sense. Two-point algorithms using rational interpolating functions are recommended. (Author)

AD-A095 026/1 PC **A02**/MF **A01**
Texas Univ. at Austin. Center for Cybernetic Studies.
Effective Solution of Non-Convex Multi-Objective Ratio Goals Problems.
Research rept.,
R. Armstrong, A. Charnes, W. W. Cooper, and C. Haksever. Dec 80, 13p Rept no. CCS-390
Contracts N00014-80-C-0242, N00014-75-C-0569

Multiple ratio goals often occur in equity considerations and imply non-linear non-convex programming problems. Charnes and Cooper's solution of such a class by a sequence of linear programs is herein implemented by an effective computational method applicable to a larger class of non-linear non-convex problems. An analytical prescription of the recursion to preserve feasibility of the last basic solution is derived. A new usage of the fast re-inversion routine of current LP codes to obtain the modified basis inverse is developed together with the further subroutines of the Opposite Sign Algorithm of Charnes and Kortanek (1963) or a negative image scheme whenever the old basic solution is not basic feasible for the modified problem. An illustration in terms of funding of State colleges in Texas is provided. (Author)

AD-A095 052/7 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
The Use of Utility in Multiattribute Utility Analysis,
Alain A. Lewis. Feb 80, 10p Rept no. RAND/P-6396

A frequent source of confusion in the application of the techniques of Multiattribute Utility Analysis is the failure to observe the distinction between value functions and utility functions. A concise exposition of this distinction is provided along with the relationships to alternative measures of preference rankings. (Author)

AD-A095 067/5 PC **A02**/MF **A01**
California Univ., Berkeley. Operations Research Center.
Conditionally Increasing Processes.
Research rept.,
Zvi Schechner. Nov 80, 18p Rept no. ORC-80-24
Grant AFOSR-77-3213

The conditional distribution of X(t) given sup X(u) < a where u varies from 0 to t of certain processes is studied. We use it to prove the IFR property of k-out-of-n systems and certain shock models and other processes. (Author)

AD-A095 085/7 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Aspects of Fair Division,
Alain A. Lewis. Apr 80, 22p Rept no. RAND/P-6475

Provides an exposition of several elementary models of fair division as they occur in the theory of games, inclusive of: The Problem of the Nile, The Ham Sandwich Problem, and The Steinhaus Solution of Divide and Choose. The discussion is intended to be essentially nontechnical, relying mostly on heuristic methods of presentation, avoiding rigorous derivation as much as possible. A broad distinction is made between mathematical formulations and game theoretic, observing however, common inter-sections. (Author)

AD-A095 140/0 PC **A02**/MF **A01**
California Univ., Berkeley. Operations Research Center.
Availability of Series Systems with Components Subject to Various Shut-Off Rules.
Research rept.,
Zohel S. Khalil. Jun 80, 21p Rept no. ORC-80-12
Grant AFOSR-77-3179

In this report we consider different shut-off rules for series systems performance. We calculate limiting system availability under various shut-off rules. In particular, availability results for 2 and 3 unit systems with all failure and repair distributions exponential are extended to systems of arbitrary size. Consider a series of system of n components. System failure in such systems coincides with component failure. However, in many systems components can still be functioning after system failure occurs, or some components on failure will shut off others. This means that some shut-off rules can be established for system performance, such as failure of first component shuts off the second and next components or failure of second component shuts off third and higher components but not the first and so on. For example, in a 3-unit system, unit 1 on failure shuts off both unit 2 and 3, unit 2 on failure shuts off only unit 3, but not 1, and units 1 and 2 are not affected when failure of unit 3 occurs.

AD-A095 179/8 PC **A03**/MF **A01**
Naval Research Lab., Washington, DC.
Cross-Entropy Minimization Given Fully-Decomposable Subset and Aggregate Constraints.
Memorandum rept.,
John E. Shore. 13 Feb 81, 26p Rept no. NRL-MR-4430

The principle of maximum entropy and the principle of minimum cross-entropy (minimum directed

divergence, minimum discrimination information) have been applied recently to problems in queueing theory and computer system performance modeling. These information-theoretic principles estimate probability distributions based on information in the form of known expected values. In the case of queueing theory and computer system modeling, the known expected values arise from rate balance equations. This paper concerns situations in which the system state probabilities decompose into disjoint subsets and in which the known expected values are either expectations conditional on a specific subset or expectations involving aggregate subset probabilities. New properties of minimum cross-entropy distributions are derived and an efficient method of computing these distributions is derived. Computational examples are included. In the case of queueing theory and computer system modeling, the disjoint subsets correspond to internal device states and the aggregate probabilities correspond to overall device states. The results of this paper apply when one has both rate balance equations for device equilibrium involving internal device state probabilities as well as rate balance equations for system equilibrium involving aggregate device state probabilities. (Author)

13.

MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

AD-A094 752/3 PC **A04**/MF **A01**
Mechanical Technology, Inc., Latham, NY.
Design of Waste Heat Boiler for Scranton Army Ammunition Plant.
Final rept.,
Robert J. Krowech, and George Scullin. Aug 80, 57p MTI-80TR64, ARLCD-CR-80030, AD-E400 464
Contract DAAK10-79-C-0406

The Army Ammunition Plant at Scranton, Pennsylvania, has rotary hearth furnaces to heat billets for the forging operation. Mechanical Technology Incorporated established the economic and operational feasibility of waste heat recovery from the most used furnaces. The flue gas flow and temperature were measured, and an energy balance was performed. Gas flow and temperature were found suitable for a small waste heat boiler. During the course of testing a flow control problem was discovered. MTI suggests that this defect be corrected before the installation of a waste heat recovery system. After exploring several concepts, MTI designed a waste heat recovery system having minimal influence on the forging operation. The payback period of 1.54 years is attractive. Also, a rigorous economic evaluation (the present worth analysis), indicates that a waste heat recovery system would be a valuable addition to the Scranton plant.

AD-A094 771/3 PC **A07**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Computer Simulation of Solar Air Heating Systems Using Rock Bed Thermal Storage Units.
Master's thesis,
Daniel Bartholomew Fant. Dec 80, 144p Rept no. AFIT/GAE/AA/80D-4

This thesis is concerned with the analysis and design of solar air heating systems utilizing rock beds as thermal storage units. A computer simulation model capable of estimating the response of both the solar collector and the rock bed is described. Differential equations describing the rock bed were approximated in a finite-difference form and solved numerically on a digital computer. The temperature of both the solid (rock) and the fluid (air) is determined as a function of time and distance along the bed. The simulation required both charging and discharging of the rock bed for time-varying inlet fluid temperatures. The numerical method used to solve the rock bed equations proved to be stable and convergent and showed satisfactory agreement in comparison to an analytical solution for constant-inlet air temperature. A cost analysis was also incorporated within this program; by varying the collector area one could determine the optimum collector size for maximum savings. Pressure drop relationships for flat-plate collectors, duct work and packed beds were used to determine operating costs. The particular air system tested proved to be cost effective when compared with natural gas fuel costs for an economic term of 20 years. (Author)

AD-A094 802/6 PC **A06**/MF **A01**
Air Force Engineering and Services Center, Tyndall AFB, FL. Engineering and Services Lab.
The U. S. Air Force Academy Solar Energy Research Project Summary Report.
Rept. for Apr 75-Jan 80,
Kenneth A. Cornelius. Jul 80, 103p Rept no. AFESC/ESL-TR-80-35

This report summarizes the solar energy research which was conducted by the U.S. Air Force Academy from April 1975 to January 1980. This research consisted of investigations on a retrofit space heating system which was installed on a typical Military Family Housing (MFH) unit. This summary uses a lessons learned and designer tips approach in its discussion of the solar system's operation. This discussion is organized around the many areas of solar technology which were investigated during the course of this project. Those major areas were energy conservation effects, solar collectors, thermal storage, control systems, Thermography studies, performance comparision to a design model, and homeowner and maintenance manual development. A thermal performance summary of the solar system is also presented. The report concludes with numerous recommendations regarding policy initiatives which the Air Force should take to foster conversion to solar technology. (Author)

ANL-CT-80-23 PC **A03**/MF **A01**
Argonne National Lab., IL.
Some Basic Considerations and Possible Improvements on the Solar Pond.
W. T. Sha, Y. S. Cha, K. V. Liu, and S. L. Soo. Jun 80, 49p
Contract W-31-109-ENG-38

Experimental results were compared to theoretical stability criteria of a salt gradient solar pond. Cellular motion in the non-convective layer is expected. Innovative concepts on friction stabilization using stabilizing barriers and longitudinal stratification to improve pond heat extraction efficiency are presented. (ERA citation 06:007496)

CEA-CONF-4799 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Nuclear District Heating. 1. Process Heat Reactors and Transmission and Distribution Networks.
R. Caizergues. 1979, 20p CONF-7909157-1
In French.French-Soviet seminar on process heat reactors, Moscow, USSR, 17 Sep 1979.
U.S. Sales Only.

Three kinds of production station are considered: joint electricity and heat-producing stations, heat-producing stations with CAS reactors and heat-producing stations with Thermos reactors. The thermal energy supply possibilities of these stations, the cost price of this energy and the cost price per therm produced by the district heating source and conveyed to the user are studied. (Atomindex citation 11:532285)

CONF-790118- PC **A99**/MF **A01**
International Solar Energy Society, Rockville, MD. American Section.
Proceedings of the 3RD National Passive Solar Conference. Volume 3.
H. Miller, M. Riordan, and D. Richards. 1979, 959p
Contract AC01-79CS30032
National passive solar conference, San Jose, CA, USA, 11 Jan 1979.

Separate abstracts were prepared for 149 of the 163 papers presented. The remaining 14 papers were previously included in the data base and can be found in the report number index under report number CONF-790118--. (ERA citation 06:007214)

DOE/BP/15325-T14 MF **A01**
Oregon Inst. of Tech., Klamath Falls. Geo-Heat Utilization Center.
Heating Facilities, Virginia Lake Townhouses and Apartments, Reno, Nevada.
Mar 80, 34p
Contract AC79-79BP15325
Available in microfiche only.

The Virginia Lake Townhouses and Apartments are located in a 12 acre parcel in the geographic center of Reno, Nevada. There are 148 apartments, consisting of 70 single story garden apartments in 10 buildings, 40 two story townhouses in six buildings, and 38 two story apartments in five buildings. All apartments are presently heated with individual natural gas fired forced air furnaces. Hot water is provided by gas fired water heaters, except for the 40 older townhouses which are using water directly from a geothermal source. This water has now been found to be unsuitable for potable use. Located on the property are two geothermal wells, complete with pumps. The larger well can deliver 500 gallons per min., and the smaller well 65 gallons per min., of the 135 exp 0 F geothermal water. The Geo-Heat Utilization Center has been asked to determine a scheme for using the geothermal water from these wells to provide the needed space and hot water heating for the 148 apartments. An outdoor swimming pool also requires heating. Space heating in all three types of apartments will be accomplished through the installation of finned water coils in existing ductwork or furnaces. Geothermal water will be pumped from Well No. 2 through a main distribution system and used directly in the coils. Piping system specifics are available in the Appendix. (ERA citation 06:007642)

DOE/CS/30122-T1 PC **A05**/MF **A01**
Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
CSU Solar Housee III Solar Heating and Cooling System Performance. Annual Report: Technical Summary, 1 October 1978-30 September 1979.
D. S. Ward, J. C. Ward, and H. S. Oberoi. Oct 80, 85p
Contract AC02-79CS30122

The objective of this study was to test and evaluate the practicality of an integrated flat-plate state-of-the-art liquid-heating solar collector and absorption cooling system installed on Colorado State University (CSU) Solar House III. This objective was accomplished by designing and installing a complete solar heating and cooling system (including appropriate data acquisition equipment and instrumentation), performing a detailed analysis and evaluation of all aspects of the solar system, and comparing the seasonal performance of the system with two other solar heating and cooling systems installed in adjacent buildings with virtually identical thermal characteristics. (ERA citation 06:007501)

DOE/ET/27256-T6 PC **A02**/MF **A01**
Oregon Inst. of Tech., Klamath Falls.
Facilities for Utilization of Geothermal Steam, Verdant Vales School, Middletown, California.
1979, 16p
Contract FG06-79ET27256

Verdant Vales School is a boarding school and summer camp located in the Geysers - Calistoga KGRA near Middletown, California. The school consists of dormitories, classrooms and related facilities to accommodate a maximum of 55 stu-

dents and a staff of 5. Energy for heating buildings and domestic hot water, is provided by electricity supplied by Pacific Gas and Electric Company. In addition, a considerable amount of LPG is consumed to heat the swimming pool and the hot water required for the automatic dishwasher in the kitchen. The school has 3000 pounds per hour of 150 psig steam available at no cost from an existing geothermal well adjacent to the school site. A preliminary design of a system has been developed that utilizes the geothermal steam to eliminate the school's LPG requirement, and minimizes outside purchases of electricity for space and water heating. Savings have been developed, and material costs for the new facilities have been estimated. (ERA citation 06:007637)

DOE/NASA/CR-161589 PC **A09**/MF **A01**
Dayton Univ., OH. Research Inst.
Solar Heating and Cooling System Installed at Columbus, Ohio. Final Report.
R. G. Coy, and R. P. Braden. Sep 80, 180p UDR-TR-80-58
Contract AB01-77CS30008

The Solar Energy System installed at Columbus Technical Institute, Columbus, Ohio was installed as a part of a new construction of a college building. The building will house classrooms and laboratories, administrative offices and three lecture halls. The Solar Energy System consists of 4096 square feet (128 panels) Owens/Illinois Evacuated Glass Tube Collector Subsystem, and a 5000 gallon steel tank below ground storage system, hot water is circulated between the collectors and storage tank, passing through a water/lithium bromide absorption chiller to cool the building. Extracts from the site files specification references, drawings, installation, operation and maintenance instructions are included. (ERA citation 06:007399)

DOE/NASA/CR-161595 PC **A09**/MF **A01**
Kaw Valley State Bank and Trust Co., Topeka, KS.
Solar Heating, Cooling, and Domestic Hot Water System Installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas. Final Report.
Nov 80, 185p
Contract AC01-77CS34030

The building has approximately 5600 square feet of conditioned space. Solar energy is used for space heating, space cooling, and preheating domestic hot water (DHW). The solar energy system has an array of evacuated tube-type collectors with an area of 1068 square feet. A 50/50 solution of ethylene glycol and water is the transfer medium that delivers solar energy to a tube-in-shell heat exchanger that in turn delivers solar-heated water to a 1100 gallon pressurized hot water storage tank. When solar energy is insufficient to satisfy the space heating and/or cooling demand, a natural gas-fired boiler provides auxiliary energy to the fan coil loops and/or the absorption chillers. Extracts from the site files, specification references, drawings, and installation, operation and maintenance instructions are included. (ERA citation 06:007400)

DOE/NASA/CR-161603 PC **A07**/MF **A01**
Columbia Gas System Service Corp., Columbus, OH.
Solar Heating, Cooling and Domestic Hot Water System Installed at Columbia Gas System Service Corp., Columbus, Ohio. Final Report.
Nov 80, 149p
Contract AB01-77CS34089

The Solar Energy System located at the Columbia Gas Corporation, Columbus, Ohio, has 2978 ft exp 2 of Honeywell single axis tracking, concentrating collectors and provides solar energy for space heating, space cooling and domestic hot water. A 1,200,000 Btu/h Bryan water-tube gas boiler provides hot water for space heating. Space cooling is provided by a 100 ton Arkla hot water fired absorption chiller. Domestic hot water heating is provided by a 50 gallon natural gas domestic storage water heater. Extracts are included from the site files, specification references, drawings, installation, operation and maintenance instructions. (ERA citation 06:007401)

DOE/SF/10540-T1 PC **A07**/MF **A01**
Texas Univ. at Austin. Center for Energy Studies.
Water-Lithium Bromide Double-Effect Absorption Cooling Analysis.
G. C. Vliet, M. B. Lawson, and R. A. Lithgow.
Dec 80, 127p
Contract AC03-79SF10540

A numerical model was developed for the transient simulation of the double-effect, water-lithium bromide absorption cooling machine, and the use of the model to determine the effect of the various design and input variables on the absorption unit performance. The performance parameters considered were coefficient of performance and cooling capacity. The sensitivity analysis was performed by selecting a nominal condition and determining performance sensitivity for each variable with others held constant. The variables considered in the study include source hot water, cooling water, and chilled water temperatures; source hot water, cooling water, and chilled water flow rates; solution circulation rate; heat exchanger areas; pressure drop between evaporator and absorber; solution pump characteristics; and refrigerant flow control methods. The performance sensitivity study indicated in particular that the distribution of heat exchanger area among the various (seven) heat exchange components is a very-important design consideration. Moreover, it indicated that the method of flow control of the first effect refrigerant vapor through the second effect is a critical design feature when absorption units operate over a significant range of cooling capacity. The model was used to predict the performance of the Trane absorption unit with fairly good accuracy. (ERA citation 06:007402)

ORNL/Sub-7321/3 PC **A04**/MF **A01**
Energy Utilization Systems, Inc., Pittsburgh, PA.
Demonstration of a Heat Pump Water Heater. Volume 3. Design Report.
B. D. Sloane, R. C. Krise, and D. D. Kent. Dec 79, 68p
Contract W-7405-ENG-26

Work performed during the pilot run manufacturing and laboratory testing stages of a heat pump water heater for residential installations is described. A general description of the heat pump water heater is provided, as are detailed discussions of individual components. Also included is a description of the pilot run manufacturing facility and experience, laboratory operations, and laboratory test data. (ERA citation 06:007882)

PAT-APPL-6-101 367 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Reflective Insulating Blinds for Windows and the Like.
Patent Application,
P. R. Barnes, and H. B. Shapira. Filed 7 Dec 79, 10p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Energy-conserving window blinds are provided. The blinds are fabricated from coupled and adjustable slats, each slat having an insulation layer and a reflective surface to face outwardly when the blinds are closed. A range of desired light and air transmission may be selected with the reflective surfaces of the slats adapted to direct sunlight upward toward the ceiling when the blinds are open. When the blinds are closed, the insulation of the slats reduces the heat loss or gain produced by the windows. If desired, the reflective surfaces of the slats may be concave. The edges of the slats are designed to seal against adjacent slats when the blinds are closed to ensure minimum air flow between slats. (ERA citation 06:004996)

PB81-803660 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Solar Furnaces. 1970-January, 1981 (Citations from the Engineering Index Data Base).
Rept. for 1970-Jan 81.
Feb 81, 73p
Supersedes PB80-804107, and NTIS/PS-79/0031.

Design, operation, and performance of solar furnaces are discussed in abstracts from worldwide literature. Topic areas include the thermodynamics and optics of operation, and the performance of the large solar furnace located at Odeillo (France). (This updated bibliography contains 68 citations, 15 of which are new entries to the previous edition.)

PB81-859621 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Blast Furnace Stoves. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Feb 81, 58p NERACASMNT3157

This retrospective bibliography reviews the operation, maintenance, and repair of blast furnace stoves. Stress corrosion cracking, air preheaters, thermocouple installations, valves, jacket metals and stone insulation are discussed. (Contains 80 citations, fully indexed and including a table of contents.)

SERI/TR-751-746 PC **A13**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Passive Solar Energy Information User Study.
W. W. Belew, B. L. Wood, T. L. Marle, and C. L. Reinhardt. Nov 80, 276p
Contract AC02-77CH00178

The results of a series of telephone interviews with groups of users of information on passive solar heating and cooling are described. These results, part of a larger study on many different solar technologies, identify types of information each group needed and the best ways to get information to each group. The overall study provides baseline data about information needs in the solar community. An earlier study identified the information user groups in the solar community and the priority (to accelerate solar energy commercialization) of getting information to each group. In the current study only high-priority groups were examined. Results from seven passive groups respondents are analyzed in this report: Federally Funded Researchers, Manufacturer Representatives, Architects, Builders, Educators, Cooperative Extension Service County Agents, and Homeowners. The data will be used as input to the determination of information products and services the Solar Energy Research Institute, the Solar Energy Information Data Bank Network, and the entire information outreach community should be preparing and disseminating. (ERA citation 06:007407)

SOLAR/0004-80/18 PC **A03**/MF **A01**
Automation Industries, Inc., Silver Spring, MD. Vitro Labs. Div.
User's Guide to Monthly Performance Reports for Sites in the National Solar Data Network.
Jun 80, 46p
Contract AC01-79CS30027

This guide reviews the individual sections of the Monthly Performance Report (MPR), explains the intent of each section, and defines the parameters used to characterize site solar energy system performance. Appendix A provides significant background information on the subsystems and design features affecting solar energy collection, storage, and distribution to building thermal load requirements in active and passive solar sites. Appendix B provides an overview of how data are collected on site and transmitted for processing and analysis. It also explains how data integrity is maintained during this process. Appendix C is a glossary of acronyms and drafting symbols found in the MPR. (ERA citation 06:007408)

SOLAR/0016-78/33 PC **A02**/MF **A01**
International Business Machines Corp., Huntsville, AL.
Comparative Evaluation of the Thermal Performance of Solar Energy Systems.
J. C. Bartlett. Nov 78, 10p
Contract AC01-77CS34049

Comparative thermal performance evaluation of different solar energy systems is difficult due to system unique parameters and varying environmental conditions. A technique is outlined for comparing the thermal performance of a variety of operational solar energy systems by using a nor-

malization procedure that reduces all systems to a common base. The examples of the parameters to be normalized are: insolation levels, loads, system size, etc. The technique is applied to comparative evaluation of three large hot water systems and results are presented based on the data collected via the National Solar Data Network during 1978. (ERA citation 06:007409)

SOLAR/1010-78/36 PC **A02**/MF **A01**
International Business Machines Corp., Huntsville, AL.
Thermal Performance Evaluation of the A-Frame Industries Solar Energy Hot Water System.
D. L. Nemetz. Nov 78, 13p
Contract AC01-77CS34049

The performance of the A-Frame Industries solar energy domestic hot water system for a single family dwelling in Kaneohe, Hawaii is evaluated based on a comparison of the predicted climatic, load and operational conditions with those measured at the site. The solar energy system and instrumentation are described, along with the method of gathering data for performance computations. Performance parameters are extrapolated for increased hot water consumption based on f-Chart projections. Although the system supplies 100 percent of the present domestic hot water load, the load must be increased before the system can realize its economic worth. (ERA citation 06:007410)

TRITA-37 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Uppvaermnings- och Ventilationsteknik.
Steam Systems for Large Heat Effects and Long Distances.
J. Rydberg. 1980, 28p
In Swedish.
U.S. Sales Only.

In Sweden hot water culverts are used for the distribution of heat in district heating systems. When big quantities of heat are to be transported, e.g., between two towns, it is considered to be economic to use steam instead of hot water. In a hot water system two big hot water pipes are needed. In a steam system only one pipe of the same dimension as the pipes in the hot water system is needed and another pipe for the returning condensate with a diameter of 30% of the diameter of the steam pipe. In a water system there also has to be a pumping station on every 10 to 20 km. The steam can be transported by its own expansion 100 to 150 km. The energy consumption for the transportation in a steam system is only half of what it is needed in a hot water system. The pump stations for the condensate need not be as big as the ones for the hot water system because only 1/10 of the amount of water is circulated. Consequently, for long distances, both investment costs and operation costs gets cheaper with a steam system. (ERA citation 06:004930)

UCRL-53081 PC **A06**/MF **A01**
Lawrence Livermore National Lab., CA.
Experimental and Numerical Study of Steady Forced-Convection Heat Transfer in a Spherical Annulus.
D. B. Tuft. 25 Nov 80, 118p
Contract W-7405-ENG-48

The results of a combined experimental and numerical study of steady forced-convection heat transfer in a spherical annulus with 50 exp 0 C heated water flowing in the annulus, an insulated outer sphere, and a 0 exp 0 C cooled inner sphere are presented. The inner sphere radius is 139.7 mm, the outer sphere radius is 168.3 mm and the radius ratio is 1.2. Measurements of inner sphere heat- flux rate distribution, flow separation angle, annulus fluid temperatures and total heat transfer were made for gap Reynolds numbers from 41 to 1086. The angle of separation along the inner sphere was found to vary as a function of Reynolds number. Measured total Nusselt numbers agreed with results reported in the literature to within 2.0% at a gap Reynolds number of 974 and 26.0% at a gap Reynolds number of 66. Results of numerical calculations of laminar incompressible fluid flow and heat transfer in a spherical annulus are presented. Velocity, temperature, pressure and heat-flux rate distributions are presented for gap Reynolds numbers from 4.4 to 440. It is believed that this is the first experimental study of spherical annulus convective heat transfer in which inner sphere heat-fux distribution has been measured and in which sepration angle was measured by non-visual methods and found to vary as a function of Reynolds number. Also, the numerical analysis is the first solution of the full laminar Navier-Stokes equations for forced-convection heat transfer in a spherical annulus. The computations predict well the experimental trends and qualitative aspects of the flow and heat transfer while underpredicting heat-flux rates by a factor of two or more. It is felt that a turbulence model is necessary to predict more accurately the experimental results. (ERA citation 06:008069)

13B. Civil Engineering

AD-A094 663/2 PC **A02**/MF **A01**
Cold Regions Research and Engineering Lab., Hanover, NH.
Road Bearing Capacity as Decided by Deflection Measurements and the Index Method,
Geir Refsdal. Nov 80, 16p Rept no. CRREL-TL-754
Trans. from Norwegian Road Research Lab., Oslo.

No abstract available.

AD-A094 683/0 PC **A19**/MF **A01**
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Engineering Condition Survey and Evaluation of Troy Lock and Dam, Hudson River, New York Report 2. Evaluation and Rehabilitation.
Carl E. Pace, Roy Campbell, and Sam Wong. Jan 81, 440p Rept no. WES-MP-C-78-6-2
See also Report 1, AD-A055 871.

The monoliths of Troy lock, dam, and headgate section must be rehabilitated in the near future or the concrete deterioration will progress to the point that the total structure will have to be replaced. Two specific areas of the structure are now in such a state of deterioration that they essentially will have to be replaced. The concrete in the land wall monoliths upstream of the upper gate have depths of deteriorated concrete in excess of 5 ft. The upper sections of the gated spillway to the powerhouse are so deteriorated that enough sound concrete would not remain for rehabilitation; replacement of the upper sections will be more efficient. The other portions of the lock and dam are generally sound (4000- to 5000-psi concrete interiors) and are adequate for effective and economical rehabilitation. The concrete tensile strength is low because of minor alkali-silica reaction products and ettringite coating of aggregates but it is adequate and is expected to remain adequate. The compressive (900 psi) and tensile (43 psi) strengths of the foundation material are very low but are adequate to resist bearing pressures and given excellent resistance for foundation anchors. There are no soft seams in the slaty-shale foundation. The foundation was very consistent. The predominant geological feature is bedding planes which dip downstream at 30 to 90 deg. This does not present any potential stability problems.

AD-A094 700/2 PC **A02**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.
The MESC Program for Marine Environmental Quality Assessment.
Technical document.
Sep 80, 7p Rept no. NOSC/TD-383

Federal and State regulatory agencies require the Navy to make environmental assessments whenever its activities might disturb existing estuarine ecosystems. These assessments are generally carried out by contractors prior to the preparation and filling of an environmental impact statement. Environmental Field Divisions (EFDs) and activities charged with awarding environmental contracts and overseeing environmental assessments are often faced with the need to obtain preliminary technical information. These data, which in general are of a physical, chemical, and biological nature, help define the spatial and temporal boundaries of the potential impact of new activities and are necessary before sound contractual agreements can be made. By its nature, this information must be readily available to the Officer-In-Charge and must be supported by expert consultants. (Author)

AD-A094 799/4 PC **A99**/MF **A01**
Army Engineer District, Philadelphia, PA.
Delaware River Dredging Disposal Study, Stage 1 Reconnaissance Report.
Jun 79, 997p Rept no. DAEN/NAP-10072/RR-79/06

A regional dredging disposal plan is to be developed for the tidal portions of the Delaware River, its tidal tributaries and Delaware Bay, extending from Trenton New Jersey to the sea and for Indian River Inlet and Bay. This reconnaissance report is written to present technical background as foundation for the study. Various appendices of this plan focus on environmental impacts of dredge disposal and inventory of various fish and wildlife in the area. Historic and archeological sites are also listed. Various plates provide maps of different actual and proposed disposal areas. (Author)

AD-A094 981/8 PC **A14**/MF **A01**
Washington Univ., Seattle. Dept. of Geography.
Nonstructural Approaches to the Management of the Snohomish River Basin FLood Hazard.
Final rept.,
Craig S. Calhoon, Marge Palmer, R. Taber Hand, Thomas Robinson, and Bruce Singbeil. Oct 80, 314p
Contract DACW67-80-M-1334
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This report analyzes means of controlling existing and probable future flood damage problems in the Snohomish River Basin in Washington State through the use of 'nonstructural' methods. These methods include small scale structural modifications to existing buildings and property subject to flood damages as well as strategies (such as land use controls) to avoid increases in damage levels. A variety of mechanisms were found to be promising for the control of existing problems in this river basin, and for the avoidance of increases in damage levels in the future. Specific recommendations are made for control strategies in each of the eight subregions studied, and basin-wide strategies for flood hazard management were also articulated. Information needed for the implementation of these strategies are outlined, and responsibilities for the achievement of these flood damage reduction strategies on the part of various levels of government are discussed. (Author)

AD-A095 064/2 PC **A12**/MF **A01**
Corps of Engineers, Seattle, WA. Seattle District.
Recreational Small Boat Moorage Study: Puget Sound and Adjacent Waters, State of Washington.
Final rept.
Oct 80, 261p
Includes folder with charts.

This update to the 1968 Puget Sound area pleasure boating study projects a near 70% increase in boat ownership in the Puget Sound region between 1980 and 2000. The demand for moorage of all kinds exceeds the capacity of existing facilities. To meet the needs of recreational boating, both public and private investments will be required. The study identifies 142 potential marina sites of which 139 received reconnaissance level design and environmental analysis. (Author)

AD-A095 082/4 PC **A99**/MF **A01**
Corps of Engineers, Buffalo, NY. Buffalo District.
St. Lawrence Seaway N.Y. Feasibility Study for Additional Locks and Other Navigation Improvements: Plan of Study. Revision.
Final rept.
Nov 79, 616p
Revision of report dated Jun 78.

This revised plan of study has been prepared to comply with the Stage I planning requirements for a feasibility level study. The material draws heavily upon secondary sources of published information from Federal, State and local agencies. Forecasts of future traffic, estimates of existing lock capacity

and related analytical documents were used in the preparation of the Revised Plan of Study. The material in this study reflects estimates of study variables as of June 1979. (Author)

AD-A095 141/8 PC **A04**/MF **A01**
Cold Regions Research and Engineering Lab., Hanover, NH.
Embankment Dams on Permafrost in the USSR.
Special rept.,
Thaddeus C. Johnson, and Francis H. Sayles.
Dec 80, 63p Rept no. CRREL-SR-80-41

The report documents a study tour of the USSR to determine the current practices in analyzing the thermal regime of embankment dams on permafrost and in application of these practices in designing dams. The results of visits to earth and rockfill dams on permafrost in Siberia are summarized. Discussions with the designers of the dams, and with a construction manager and an operations manager, are recorded. The leading Soviet engineers and scientists specializing in analysis of thermal regime of embankment dams on permafrost were consulted, and the discussions are summarized. Experimental facilities of institutes concerned with this question also were inspected. (Author)

AD-A095 180/6 PC **A02**/MF **A01**
Institute for Water Resources (Army), Fort Belvoir, VA.
The Salinity Effects of Deepening the Dredged Channels in the Chesapeake Bay.
Technical paper,
David F. Bastian. Dec 80, 15p Rept no. IWR-NWS-81-S1
Presented at the World Dredging Conference (9th), 29-31 Oct 80.

Recent tests on the Chesapeake Bay Model, the world's largest estuarine model, were used to assess the effects of increasing the approach channels to Baltimore from 13 meters to 15 meters. There are four sections of dredged channels comprising 55 kilometers of the 277 kilometer distance from the bay mouth to Baltimore. The increased depth of channel would extend the length of dredged channels to 79 kilometers. First, base tests using the existing 13-meter channels were conducted to determine the synoptic velocity, salinity, and tidal conditions at a number of locations throughout the bay but primarily in the dredged channels. To give meaningful results, a 2-1/2 year hydrographic period was simulated in the model to enhance the evaluation by adding the variable discharge as a parameter. Furthermore, a 12 constituent harmonic tide was used given a 28-lunar-day tidal sequence which simulating a lunar month was repeated throughout the test. The entire test was repeated but with the 15-meter channel installed. The primary result from the test is the comparison by location of the changes from base to plan of the salinity time histories which vividly show the effects of geometry, tidal and discharge changes. (Author)

BMFT-FB-T-80-022 PC **A13**/MF **A01**
Maschinenfabrik Augsburg-Nuernberg A.G., Munich (Germany, F.R.).
Heat Recovery from Waste Water by Energy-Saving Heat Pump Systems in Connection with Water Treatment Plants.
U. Wiedmann, and R. Flohrschuetz. Apr 80, 286p
In German.
U.S. Sales Only.

Separate abstracts were prepared for eight chapters included in this report. (ERA citation 06:007935)

DOE/EA-0126 PC **A06**/MF **A01**
Argonne National Lab., IL.
Environmental Assessment Related to the Conversions of Boilers No. 1 and No. 5 at Argonne National Laboratory.
Dec 80, 117p ANL/ES-107
Contract W-31-109-ENG-38

This environmental assessment addresses the conversion of ANL's Boiler No. 5 to high-sulfur-coal firing and the replacement of the old Boiler No. 1 with an atmospheric fluidized-bed combustion unit to burn coal. Attention is especially focused on the air-quality impacts expected during the period between the initial coal conversion and the installation of pollution-control equipment on Boiler No. 5. Burning 50,000 t (55,000 tons) of coal each year will replace the consumption of 3.5 x 10 exp 7 m exp 3 (1.22 x 10 exp 9 ft exp 3) of natural gas and 2900 m exp 3 (760,000 gal) of fuel oil. (ERA citation 06:008104)

DOE/ET/27127-1 MF **A01**
Texas Univ. at Austin. Bureau of Economic Geology.
Environmental Analysis of Geopressured-Geothermal Prospect Areas, De Witt and Colorado Counties, Texas. Final Report, March 1 - August 31, 1979.
T. C. Gustavson, F. S. Reeder, and E. A. Badger. Feb 80, 282p
Contract AS05-79ET27127
Available in microfiche only.

Information collected and analyzed for a preliminary environmental analysis of geopressured geothermal prospect areas in Colorado and DeWitt Counties, Texas is presented. Specific environmental concerns for each geopressured geothermal prospect area are identified and discussed. Approximately 218 km exp 2 (85 mi exp 2) were studied in the vicinity of each prospect area to: (1) conduct an environmental analysis to identify more and less suited areas for geopressured test wells; and (2) provide an environmental data base for future development of geopressured geothermal energy resources. A series of maps and tables are included to illustrate environmental characteristics including: geology, water resources, soils, current land use, vegetation, wildlife, and meteorological characteristics, and additional relevant information on cultural resources, power- and pipelines, and regulatory agencies. A series of transparent overlays at the scale of the original mapping has also been produced for the purposes of identifying and ranking areas of potential conflict between geopressured geothermal development and environmental characteristics. The methodology for ranking suitability of areas within the two prospect areas is discussed in the appendix. (ERA citation 06:007634)

DOE/EV-0116 PC **A10**/MF **A01**
Iowa State Univ., Ames.
Water-Related Environmental Control Requirements at Municipal Solid Waste-to-Energy Conversion Facilities.
J. C. Young, and L. D. Johnson. Sep 80, 205p
Contract W-7405-ENG-82

Water use and waste water production, water pollution control technology requirements, and water-related limitations to their design and commercialization are identified at municipal solid waste-to-energy conversion systems. In Part I, a summary of conclusions and recommendations provides concise statements of findings relative to water management and waste water treatment of each of four municipal solid waste-to-energy conversion categories investigated. These include: mass burning, with direct production of steam for use as a supplemental energy source; mechanical processing to produce a refuse-derived fuel (RDF) for co-firing in gas, coal or oil-fired power plants; pyrolysis for production of a burnable oil or gas; and biological conversion of organic wastes to methane. Part II contains a brief description of each waste-to-energy facility visited during the subject survey showing points of water use and wastewater production. One or more facilities of each type were selected for sampling of waste waters and follow-up tests to determine requirements for water-related environmental controls. A comprehensive summary of the results are presented. (ERA citation 06:007936)

DOE/LC/10787-69 PC **A04**/MF **A01**
Geokinetics, Inc., Concord, CA.
Environmental Research Plan for the Geokinetics Inc. Investigation of the Horizontal in Situ Oil Shale Retorting Process.
H. K. L. Spradlin, D. L. Hutchinson, and S. G. Mankowski. 30 Nov 79, 54p
Contract FC20-78LC10787

The development of a horizontal in-situ retorting process may have significant impacts upon valuable environmental resources. A research program has been developed to identify, assess, and minimize the adverse environmental impacts which may result. The goals are to: describe the environment as it existed prior to disturbance; determine the nature and extent of the changes; develop and implement measures to minimize the adverse impacts; develop and implement reclamation procedures which will return the affected land to its original level; and coordinate measures to protect the health and safety of persons and animals which may be affected by the activities. Specific research areas are outlined. These include atmospheric, hydrologic, terrestrial ecology, and social/economic research. (ERA citation 06:006982)

DOE/METC/14787-103 PC **A03**/MF **A01**
PEDCo-Environmental, Inc., Cincinnati, OH.
Acid Rain: The Impact of Local Sources.
P. Spaite, M. P. Esposito, M. F. Szabo, and T. W. Devitt. 24 Nov 80, 28p
Contract AC21-80MC14787

It has been assumed that acid rain is predominantly a problem of long-range transport of pollutants from large fossil fuel combustion sources, namely coal-fired utilities. However, close examination of fuel use information and source emission characteristics in the Adirondacks, Florida, and California suggests that local oil burning and automotive sources may be major contributors to the occurrence of acid rain in these areas. This report describes the possible role of local combustion sources in the production of acid rain, discusses the implications of the findings, and their relevance to alternative control strategies for acid rain. Oil-fired boilers, especially the smaller commercial, industrial, and residential units, produce at least 3 to 10 times as much primary sulfate per unit of sulfur content as coal-fired units. Moreover, oil-fired units emit comparatively large quantities of catalytic compounds capable of rapidly converting still more sulfur oxide to sulfate in the atmosphere. Thus, in areas where large quantities of oil are burned, the direct impact from locally generated sulfates may equal or even exceed that produced by imported sulfates derived from distant coal-burning sources. Fuel consumption data show that large quantities of oil are being consumed in areas experiencing acid rain. Forty percent of the residual and 36 percent of the distillate oil burned in the United States is consumed in the eight-state area surrounding the Adirondacks. California is the next largest oil-consuming area and Florida is third. Nitric acid is responsible for about 30 percent of rainfall acidity in the Northeast and Florida, and for about 30 to 75 percent of the rainfall acidity in California. (ERA citation 06:008105)

DOE/RG/06359-1 PC **A07**/MF **A01**
Systems Control, Inc., Palo Alto, CA.
Analysis of 12 Electric Power System Outages/Disturbances Impacting the Florida Peninsula.
Dec 80, 137p
Contract AC01-78RG06359

Between January 3 and August 3, 1979, there were 12 occasions on which electric power was curtailed or public appeals were made to customers to reduce their load in Peninsular Florida due to bulk electric power supply problems. The Economic Regulatory Administration (ERA) of the US DOE, pursuant to its electric power supply adequacy and reliability responsibilities, initiated a twofold analysis of the bulk power supply situation in Florida. The first phase of the analysis evaluated the technical and engineering aspects of the overall Florida bulk power supply system with special attention given to the City of Jacksonville's electric system. The second phase evaluated the socio-economic impacts of the bulk power supply outages on residential customers in Jacksonville. The 12 disturbances are described and a comparative analysis of the causes is presented. (ERA citation 06:007717)

DOE/TIC-11308 PC **A03**/MF **A01**
Lawrence Livermore National Lab., CA.
Environment, Health, Socioeconomics and Environmental Control Technology. Executive Summary.
D. W. Layton. Oct 80, 38p
Contract W-7405-ENG-48

This report summarizes the important findings of a two-volume report that deals with the potential im-

pacts and environmental controls associated with the operation of geothermal power plants in California's Imperial Valley. The valley contains nearly a third of the nation's total energy potential for identified hot-water resources. Possible impacts of developing those resources include violation of air quality standards if emissions of hydrogen sulfide are not abated, negative ecological effects resulting from increased in the salinity of the Salton Sea, and damage to irrigation systems caused by land subsidence induced by the extraction of geothermal fluids. Other minor impacts concern occupational health and safety, socioeconomics, and hazardous wastes. Analyses of environmental impacts and the control measures for minimizing negative impacts are based primarily on a projected production of 3000 MW of electrical power by the year 2010. (ERA citation 06:007635)

LBL-11324 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Accuracy of the Edgeworth Expansion of LOLP Calculations in Small Power Systems.
D. J. Levy, and E. P. Kahn. Jul 80, 10p CONF-810201-2
Contract W-7405-ENG-48
IEEE Power Engineering Society meeting, Atlanta, GA, USA, Feb 1981.

Because they speed numerical calculations and exhibit functional dependences, Edgeworth-type series are increasingly used to approximate and calculate LOLP's. They are usually sufficiently accurate for large power systems (>15,000 MW), but can be very inaccurate for small systems or those with low forced outage rates. This is because the approximating Edgeworth-type series are appropriate only for continuous probability densities, while discrete lattice-type density functions describe a typical power system's probability properties. This paper investigates these inaccuracies for small systems (less than or equal to 5000 MW), working out specific examples in a numerical approach and examining underlying functional dependences in an analytic approach. (ERA citation 06:007695)

NUREG/CR-1322 PC **A22**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Critical Review: Radionuclide Transport, Sediment Transport, and Water Quality Mathematical Modeling; and Radionuclide Adsorption/Desorption Mechanisms,
Y. Onishi, R. J. Serne, E. M. Arnold, C. E. Cowan, and F. L. Thompson. Jan 81, 512p PNL-2901

This report describes the results of a detailed literature review of radionuclide transport models applicable to rivers, estuaries, coastal waters, the Great Lakes, and impoundments. Some representative sediment transport and water quality models were also reviewed to evaluate if they can be readily adapted to radionuclide transport modeling. The review showed that most available transport models were developed for dissolved radionuclides in rivers. These models include the mechanisms of advection, dispersion, and radionuclide decay. The report also discusses radionuclide adsorption/desorption distribution ratios and addresses adsorption/desorption mechanisms and their controlling processes for 25 elements under surface water conditions.

ORNL/MIT-318 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Ozonolysis of Aqueous Solutions of Phenol and Thiocyanate.
G. H. Kemker, S. J. Roadcap, and R. Sitchin. Dec 80, 48p
Contract W-7405-ENG-26

Bench-scale, batch ozonolysis of a synthetic coal-conversion waste-water containing phenol and thiocyanate was performed. Experimental results indicated that the rate of destruction of the substrate was a constant and zero-order, rate-controlled by liquid-phase diffusion of ozone. Regression analysis of experimental data was used to obtain expressions for phenol and thiocyanate ozonolysis in terms of observable operating parameters. Cyanide concentration was found to reach a maximum of 35% of the initial thiocyanate concentration and to occur when thiocyanate concentration reached zero. (ERA citation 06:006887)

PB81-141731 PC **A07**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Untersuchung des baulichen Aufwandes und der Leistunsfaehigkeit von Autobahnknoten. Untersuchung der Leistungsfaehigkeit von Knotenpunkten und der Baukosteneinsparung beim Stufenweisen Ausbau (Comparative Analysis of Construction Expediture and Capacity of Motorway Junctions. Investigation into the Capacity of Junctions and Savings of Construction Costs by Means of Stage Construction).
Issue no. 230,
Karl-Heinz Trapp. 1977, 144p
Text in German.

The cloverleaf junction is a special feature of the German motorway and is characterized by its economy. Its capacity under conditions of high turning traffic volumes is however problematical, in particular with respect to direct entrances from loops and tangents into frontage roads (roadways parallel to the motorway). By means of an alteration of the geometric design of these areas, a previous investigation resulted in an increase in capacity and improvement of traffic flow and safety. Due to the bottlenecks described and the increase in traffic density a growing number of motorway junctions were planned and built with direct ramps. These are however very costly and require large areas for accommodation. The present investigation has been carried out with the objective of developing improved cloverleaf designs and comparing the capacity and constructional expenditure with those of the cloverleaf design used hitherto and those of junctions with direct ramps.

PB81-141749 PC **A09**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Programmsystem zur Optimierung des Strassenentwurfs. Teil VII. Optimierung der Trasse im Lage- und Hoehenplan (Program System for the Optimization of Highway Design. Part VII. Optimization of Horizontal and Vertical Alignment).
Issue no. 226,
Jan Amkreutz, Jochen Boesefeldt, Hajo Hamester, and Gerlach Spies. 1977, 179p
Text in German.

As a further development of the model conceptions with respect to the partial shifting of the horizontal alignment, this paper will demonstrate how the EPOS program system, with a corresponding expansion of the model, can be used for a controlled optimization of horizontal and vertical alignment. The interrelationship between the horizontal and vertical alignment models is thereby affecting the optimum alignment. Hence it was necessary to adjust the existing cross section model, linking the various section models, to meet the changed requirements. The integrated data flow was decisive for the objective. The principles required for developing the system have already been described. The system expansions were carried out to be able to use the EPOS system for the determination of an optimum alignment by means of implied and explicit employment of individual programs. With an example, the possibilities this program system can open up to highway designers in practical engineering are pointed out.

PB81-141756 PC **A09**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Programmsystem zur Optimierung des Strassenentwurfs. Teil IV. DV-Standardquerschnitt. Teil VI. Partielle Verschiebung der Linienfuehrung im Lageplan. Teil VIII. Sichtweite als Entwurfs-und Optimierungskriterium (Program System for the Optimization of Highway Design. Part IV: Standard Cross Section Suitable for Electronic Data Processing. Part VI: Partial Shifting of Horizontal Alinement. Part VIII: Sight Distance as a Criterion for Design and Optimization).
Issue no. 224,
Joschen Boesefeldt, Nicolaus Hatzimichail, Matthias Schloesser, Jan Amkreutz, and Gerlach Spies. 1977, 199p
Text in German.

In view of the progressing development of the EPOS program system for the optimization of horizontal and vertical alignment in highway design a more exact identification of cross section parameters for the calculation of different individual sections became necessary. Such calculations require that flexible and standardized programs for the calculation of cross sections be available. In order to set up such computer programs, a standardization of typical cross sections suitable for electronic data processing was achieved by elaborating cross section parameters suitable for electronic data processing. Within this context, a so called model cross section, in short DVQ', was developed as a general framework within which any cross section can be described by means of uniform parameters and represented in a form suitable for electronic data processing. On the basis of these preparations, in particular, the detailed parameter table drawn up, a system and program development of a universal set of programs for an extended range of application could be tackled once design optimization had been solved. For this purpose, uniform data input forms for conventional typical and special cross sections were first drawn up. After further elaboration of the design requirements still to be settled, the system was conceived, realized and documented. The possibilities of the partial shifting of horizontal alignment were to be examined as a further development of the findings resulting from previous development stages of the program system for the optimization of highway design. In view of the requirement stipulated in the RALL-1 that the necessary stopping sight distance and an adequate proportion of passing sight distances be provided, it proved to be necessary to consider the sight distance criterion already at the stage of initial alignments.

PB81-148348 PC **A05**/MF **A01**
Charles County Community Coll., La Plata, MD.
Field Study of Nutrient Control in a Multicell Lagoon.
Final rept. Jul 75-Feb 80,
William T. Engel, and Thomas T. Schwing. Aug 80, 84p EPA-600/2-80-155
Grant EPA-R-803637

This report covers nutrient control in a serially arranged, multicell aerated lagoon system over a three year period. The objective was to develop reliable technology for reducing phosphorus and for converting ammonia-nitrogen to nitrate-nitrogen. A six-cell lagoon was modified into two independent three-cell systems. One system was maintained as a control and the other was the test system used for nutrient control. Alum was added to the third cell of the test system. Another test was conducted with alum being fed to the first cell. The alum addition in the third cell was more effective in reducing phosphorus. A plastic media tower was added after the third cell in the test system for nitrification of ammonia-nitrogen. Consistent nitrification was achieved during the warmer months and reduced efficiencies were obtained during the cold weather months.

PB81-148728 PC **A02**/MF **A01**
New York State Dept. of Environmental Conservation, Albany.
Characterization of Particulate Emissions from In-Use Diesel Vehicles.
Journal article,
Richard E. Gibbs, James D. Hyde, and Stanley M. Byer. c1980, 25p EPA-600/J-80-209
Pub. in Society of Automotive Engineers, Inc., Technical Paper Series No. 801372, p1-22 1980.

Particulate emissions data are presented from a group of 19 in-use diesel automobiles. Five driving cycles and three fuel/lubricating oil combinations have been used to obtain particulate emissions data and also to collect particulate samples for chemical and bioassay characterization studies. Particulate samples are solvent extracted with dichloromethane to obtain the soluble organic fraction (SOF) of the emitted particulate. Particulate and SOF data are presented for emission/distance, emission/time and emission/fuel consumed basis by vehicle manufacture, driving cycle, and fuel/oil subcategory. Some SOF samples have been used in the bioassay test of Ames, and these results are presented for different vehicles and driving cycles. Particulate emissions, SOF emissions and bioassay activity results are presented in terms of mileage accumulation effects. (Copyright (c) 1980 Society of Automotive Engineers, Inc.)

PB81-148744 PC **A02**/MF **A01**
Environmental Monitoring and Support Lab.-Cincinnati, OH.
Organics in the Environment.
Journal article,
William L. Budde, and James W. Eichelberger.
May 79, 5p EPA-600/J-79-117
Pub. in Analytical Chemistry, p567A-574A May 79.

With the large number of measurement techniques available, the designer of an environmental monitoring system must select those most appropriate for the situation. Although many tools exist, each has a different capability, cost, and complexity of operation.

PB81-150377 PC **A03**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Atmospheric Pollution from Vehicle Emissions: Measurements in Situations of Restricted Dispersion,
A. J. Hickman, and Christine A. Lunn. c1980, 32p
TRRL-SUPPLEMENTARY-609
Also pub. as ISSN-0305-1315.

Measurements of carbon monoxide and lead levels were made under two bridges, built to carry motorways over roads trafficked by 16000 and 6000 vehicles/day, in order to investigate whether pollutant levels were higher than those normally found at open sites. The monitoring equipment was located in the center of both bridges and also near a gap in one bridge. The average carbon monoxide levels found were 3.8, 3.7, and 5.3ppm and the average lead levels were 2.4, 2.7, and 3.9micrograms/cu m. A detailed analysis was made of the carbon monoxide data. It was not possible with the lead data because of the much longer sampling period. It was found that the conditions at the more heavily trafficked site were comparable with those at an open site. At the less heavily trafficked site pollution levels were higher than expected probably due to the proximity of a roundabout, causing vehicles' engines to operate in more polluting modes, and also to the reduced turbulence from lower traffic flows. (Copyright (c) Crown Copyright 1980.)

PB81-150641 PC **A02**/MF **A01**
Rijksinstituut voor Drinkwatervoorziening, The Hague (Netherlands).
Introduction of Chemical Compounds Into Drinking Water during Distribution,
B. C. J. Zoeteman, and B. J. A. Haring. 1978,
25p RID MEDEDELING-78-6

Contents: Piping materials used for water distribution in the European Communities; Processes causing the release of compounds from piping materials; Results of a study in the Netherlands on changes of the levels of some water contaminants during distribution.

PB81-150864 PC **A14**/MF **A01**
Pacific Environmental Services, Inc., Elmhurst, IL.
Study of the 1979 State Implementation Plan Submittals. An Overview of the SIP Review Process at the State Level and the SIPs for Particulate Matter, Sulfur Dioxide and Ozone.
Final rept.,
Indur Goklany, Vinod Bhatia, and Thomas Blaszak. Dec 80, 315p AQ-7353-3A
Contract 3-AQ-7353

This technical overview of the state implementation plan development process is based on the revised SIPs submitted in 1979 in response to the requirements of the 1977 Clean Air Act Amendments. Evaluates the adequacy of the emission inventory and ambient air monitoring, and meteorological data bases. Gathered information on SIP development processes for total suspended particulates, sulfur dioxide and photochemical oxidants.

PB81-150880 PC **A06**/MF **A01**
SRI International, Menlo Park, CA.
Study of the Adequacy of Air Monitoring. Part II--Inhalable Particulates.
Draft rept.,
Robert M. Patterson, Leonard A. Cavanagh, and Ronald E. Ruff. Dec 80, 121p AQ-7405-8E

This is a study of the current status of inhalable particulate monitoring, the need for future monitoring, and of the status of a National Ambient Air Quality Standard for inhalable particulates. The study asked about the extent of the data base available on particulates, the quality of current monitoring techniques, a size-specific standard for particulates, and possible effects of a standard.

PB81-151375 PC **A17**/MF **A01**
Crain and Associates, Menlo Park, CA.
The Runaround: User-Side Subsidies for Mass Transportation in Danville, Illinois.
Final rept. Aug 77-Apr 80,
David Koffman, and Pamela Bloomfield. Apr 80, 380p UMTA-IL-06-0034-80-1
Contract DOT-TSC-1408

In August 1977, the City of Danville, Illinois was awarded a two-year amendment to an Urban Mass Transportation Administration Service and Methods Demonstration grant to test the application of a user-side subsidy concept supporting fixed-route transit to be provided by private transportation companies. This document discusses Phase II and the second year of Phase I. The distinguishing feature of a user-side subsidy is that providers of a service receive the subsidy only in amounts proportional to the number of people who use the service. The user-side subsidy arrangement offers a number of strong advantages over more conventional subsidy arrangements, and the overriding advantage is its value in promoting efficient use of transportation resources. This report discusses service provided by private contractors who were selected on a competitive basis every four months.

PB81-151557 PC **A07**/MF **A01**
Cal Recovery Systems, Inc., Richmond, CA.
Processing Equipment for Resource Recovery Systems. Volume III. Field Test Evaluation of Shredders.
Final rept.,
George M. Savage, and Geoffrey R. Shiflett. Jul 80, 137p EPA-600/2-80-007C
Contract EPA-68-03-2589

This report presents the results of a program to test and evaluate large-scale shredders used for the size reduction of solid waste. In all, tests were conducted on seven horizontal hammermills, one vertical hammermill, and one vertical ring shredder at six commercial sites. Both two stage size reduction and single stage size reduction were studied as part of this work. Evaluation and interpretation of the data have resulted in the development of analytical relationships among the comminution parameters and the establishment of levels of performance with respect to energy consumption and hammer wear associated with size reduction of solid waste.

PB81-151565 PC **A03**/MF **A01**
Universidad del Valle, Cali (Colombia).
Tecnologia Sencilla Aplicada a Familias Campesinas de Escasos Recursos (Simple Technology Applied to Country Families of Low Income),
Francisco Antonio Burbano Marin. Jul 80, 39p
Text in Spanish. Sponsored in part by Universidad Centroamericana Jose Simeon Canas, San Salvador (El Salvador). Proceedings of the International Symposium of Engineering (3rd) Held at UCA on July 25-30, 1980.

The report describes construction techniques for drilling wells, storage of water, and sanitation in rural areas of Colombia.

PB81-152076 PC **A02**/MF **A01**
Secretaria de Asentamientos Humanos y Obras Publicas, Mexico City.
Los Caminos Rurales en Mexico (Rural Roads in Mexico),
Raul Salinas de Gortari, and Ricardo Bahena Brito. Jul 80, 22p
Text in Spanish. Sponsored in part by Universidad Centroamericana Jose Simeon Canas, San Salvador (El Salvador). Proceedings of the International Symposium of Engineering (3rd) Held at UCA on July 25-30, 1980.

The content of this paper represents a summary of the work done by La Direccion General de Caminos Rurales, Secretaria de Asentamientos Humanos y Obras Publicas, Mexico. It describes different operational phases in the rural roads construction developed in Mexico.

PB81-152175 PC **A04**/MF **A01**
Associated Environmental Consultants, Charlottesville, VA.
APTI (Air Pollution Training Institute) Course 427 Combustion Evaluation, Student Workbook,
J. Taylor Beard, F. Antonio Iachetta, and Lembit U. Lilleleht. Feb 80, 65p EPA-450/2-80-064
Contract EPA-68-02-2893
See also report dated Feb 80, PB80-207798.

This Student Workbook is used in conjunction with Course 427, 'Combustion Evaluation' as applied to air pollution control situations. The workbook was prepared by the EPA Air Pollution Training Institute (APTI) to provide problem solving exercises of typical combustion calculations as a supplement to the course lecture materials. Sample problems are presented for: Combustion fundamentals, Combustion design, Emission calculations, Pollutant concentrations, Afterburner design, and Fuel requirements.

PB81-152324 PC **A11**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Dynamic Response of Embankment, Concrete-Gravity and Arch Dams Including Hydrodynamic Interaction,
John F. Hall, and Anil K. Chopra. Oct 80, 242p
UCB/EERC-80/39, NSF/RA-800298
Grants NSF-ATA74-20554, NSF-ENV76-80073

An analysis procedure in the frequency domain is developed for determining the earthquake response of a dam including hydrodynamic interaction and water compressibility effects. Linear responses of idealized, two-dimensional gravity dams and three-dimensional dams, including arch dams, can be obtained. The dam and fluid domain are treated as substructures and modeled with finite elements. The only geometric restriction is that an infinite fluid domain must maintain a uniform cross-section beyond some point in the upstream direction. For such an infinite uniform region, a finite element discretization within the cross-section combined with a continuum representation in the infinite direction provides for a proper transmission of pressure waves. The fluid domain model approximately accounts for fluid-foundation interaction through a damping boundary condition applied along the reservoir floor and sides. The dam foundation is assumed rigid. Hydrodynamic effects are shown to be equivalent to an added mass and added load in the frequency domain equations of motion of the dam. Hydrodynamic effects on the dam response are investigated for acceleration responses to harmonic ground motions. Complex frequency response functions for acceleration at the dam crest are presented for two-dimensional concrete gravity and earth dams and for a three-dimensional arch dam. Several reservoir shapes are included for the concrete gravity dams. Water compressibility and fluid-foundation interaction significantly influence the response of concrete gravity dams and are even more important for the arch dam. One effect is a greatly increased importance for the vertical component of ground motion. Hydrodynamic effects on the responses of earth dams are shown to be minor.

PB81-152407 PC **A05**/MF **A01**
Oklahoma Univ., Norman. School of Civil Engineering and Environmental Science.
Paratransit Curriculum Guide.
Rept. for 1977-80,
Allen R. Cook, and Charles E. Barb, Jr. Jan 80, 78p UMTA-OK-11-0001-81-1
See also PB80-103237.

The report is one element of a set of curriculum materials to support university classroom and professional short course training in local paratransit planning. This Guide supports these materials and provides guidelines for the use of instructors and students engaged in self-study. The Guide also provides suggestions on the use of these materials in university and short course instruction, with emphasis on encouraging students to get involved in local paratransit development. The Guide first introduces the curriculum materials, reviews their development, and then provides an extensive set

of suggested student exercises and curriculum options. The emphasis is on 'experimental' learning, which includes getting the students involved in local paratransit research and development. The Guide concludes with a commentary on changing perspectives in transportation education.

PB81-152530 PC **A10**/MF **A01**
TRC Environmental Consultants, Inc., Wethersfield, CT.
Planning Study to Model and Monitor Coal Pile Runoff. Phase I.
Final rept. Jun 79-Jul 80,
G. T. Brookman, J. A. Ripp, P. B. Katz, B. C. Middlesworth, and D. K. Martin. Feb 81, 220p EPA-600/7-81-016, IERL-RTP-1115
Contract EPA-68-02-3115
Sponsored in part by Edison Electric Inst., Washington, DC.

The report describes a planning study for predicting and monitoring the hydrologic and chemical characteristics of effluent streams resulting from precipitation impacting on open storage of coal. It includes: a survey of utilities on storage habits and treatment systems for coal pile runoff, the development of a runoff model, a work plan to field test the model, and procedures for the field program. The survey includes information from 81 plants on size, shape, and handling practices for coal stocks and criteria used to design coal pile runoff treatment. The model developed in this program is in two sections: a hydraulic model TRCH20 and a quality model TRCCOAL. The model is capable of describing the surface and interior reaction in the coal pile as well as in the groundwater. A sensitivity analysis of several model parameters is also provided.

PB81-153116 PC **A23**/MF **A01**
Los Angeles-Orange County Metropolitan Area Project, Whittier, CA.
Draft Facilities Plan/Program, Proposed Sludge Management Program for the Los Angeles/Orange County Metropolitan Area.
Draft rept. (Final).
Apr 80, 538p
Grant EPA-C-046-1042-011
Sponsored in part by California State Water Resources Control Board, Sacramento, Los Angeles, CA., Los Angeles County Sanitation Districts, Whittier, CA., and Orange County Sanitation Districts, CA.

Development of sludge management facilities proposed for the City of Los Angeles, Los Angeles County Sanitation Districts, and Orange County Sanitation Districts is discussed in detail. Facilities are described for each agency to accommodate sludge loads projected to the year 2000. Policy actions, continuing research needs, and implementation schedules are also specified.

PB81-153215 PC **A08**/MF **A01**
Environmental Protection Agency, Washington, DC. Municipal Construction Div.
NPDES Compliance Sampling Inspection Manual.
Technical rept.
May 79, 155p EPA/MCD-51

This publication offers guidelines for performing NPDES Compliance Sampling Inspections by State and Federal Compliance Inspectors.

PB81-153231 PC **A05**/MF **A01**
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD).
Nov 80, 82p EPA/450/4-80-012
See also report dated May 78, PB-283 696.

Ambient air monitoring guidelines are described for sources that may be required to monitor the air quality under the Prevention of Significant Deterioration (PSD) regulations. Some step-by-step discussion is presented for a source to determine if monitoring will be necessary. Situations where existing air quality and meteorological data, modeling, and use of assumed background concentrations for certain areas may be used in lieu of monitoring, are shown. If a source must undertake a monitoring program, general guidance is given for pollutants to be monitored, number and location of monitoring sites, equipment, frequency and duration of sampling, and data reporting. More detailed guidance is discussed for air quality monitoring probe citing criteria for various pollutants, meteorological monitoring, and quality assurance procedures.

PB81-153413 PC **A07**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Treatment of Non-Linear Drag Forces Acting on Offshore Platforms,
Bui Van Dao, and Joseph Penzien. May 80, 128p UCB/EERC-80/13, NSF/RA-800199
Grant NSF-PFR77-20667

The hydrodynamic drag forces acting on an offshore platform, as described by the Morison equation, are nonlinear and are coupled to response of the structure. Using this formulation as a basis, comparisons are made with the drag forces derived from two different approximations: (1) a method which uncouples the drag forces from structural response, but retains their basic nonlinear character, and (2) the standard method of equivalent linearization. Drag forces are determined by the three different formulations mentioned above for a simple cylindrical single-degree-of-freedom system, having a fundamental period and damping ratio comparable to real offshore platforms. Response to both harmonic and random wave motions are presented in the form of steady state amplitudes and extreme value distributions, respectively. The adequacy of each method is discussed.

PB81-153496 PC **A04**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Inspection and Maintenance Staff.
Analysis of the Emission Inspection Analyzer.
Technical rept.,
William B. Clemmens. Sep 80, 66p EPA-AA-IMS-80-5-A

Recently, there has been more emphasis on checking the performance of in-use vehicles. This is occurring through the implementation of state inspection and maintenance (I/M) programs as well as the forthcoming emission repair warranty regulations (207(b)) authorized by the Clean Air Act. Practically all of the I/M data will be generated by field emission inspection analyzers (as opposed to laboratory equipment) in both centralized programs (i.e. central inspection lanes) and decentralized programs (i.e. inspection conducted by independent service centers). This data will affect the consumer through required maintenance, the automobile manufacturer through warranty claims, the State through emission credits, and the EPA through its ability to judge the effectiveness of the individual I/M programs. Obviously, a fundamental issue that an I/M program must deal with is the accuracy and validity of the test data taken under these programs. An inseparable part of that issue is the quality of the equipment used to obtain the data. Various state and trade associations have developed standards to control the quality of the equipment used, but as yet there are no nationally accepted minimum standards for inspection analyzers. An examination of the data validity issue should then encompass both -- Is the data generated under present conditions sufficiently valid, and -- Is there a need for minimum quality standards for inspection analyzers. The subject of this report deals with these questions and issues.

PB81-153504 PC **A06**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Inspection and Maintenance Staff.
Recommended Specifications for Emission Inspection Analyzers.
Technical rept.,
William B. Clemmens. Sep 80, 121p EPA-AA-IMS-80-5-B

Recently, there has been more emphasis on checking the performance of in-use vehicles. This is occurring through the implementation of state inspection and maintenance (I/M) programs as well as the forthcoming emission repair warranty regulations (207(b)) authorized by the Clean Air Act. Practically all of the I/M data will be generated by field emission inspection analyzers (as opposed to laboratory equipment) in both centralized programs (i.e. central inspection lanes) and decentralized programs (i.e. inspection conducted by independent service centers). This data will affect the consumer through required maintenance, the automobile manufacturer through warranty claims, the State through emission credits, and the EPA through its ability to judge the effectiveness of the individual I/M programs. Obviously, a fundamental issue that an I/M program must deal with is the accuracy and validity of the test data taken under these programs. An inseparable part of that issue is the quality of the equipment used to obtain the data. Various state and trade associations have developed standards to control the quality of the equipment used, but as yet there are no nationally accepted minimum standards for inspection analyzers. An examination of the data validity issue should then encompass both -- Is the data generated under present conditions sufficiently valid, and -- Is there a need for minimum quality standards for inspection analyzers. The subject of this report deals with these questions and issues.

PB81-153561 PC **A02**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Test and Evaluation Branch.
Summary Report of Several Ambient Carbon Monoxide Studies.
Technical rept.,
Mark Wolcott. Nov 80, 24p EPA-AA-TEB-81-9

The Federal Clean Air Act assigns to the United States Environmental Protection Agency (EPA) the responsibility to promulgate National Ambient Air Quality Standards (NAAQS) regarding carbon monoxide (CO). On August 8, 1980 EPA proposed CO standards of 25 parts per million (ppm) maximum allowable one hour expected concentration level and 9 ppm maximum allowable expected eight hour average concentration level. In an effort to achieve these standards the Clean Air Act also assigns to EPA the responsibility to promulgate regulations regarding the amount of CO new highway vehicles may emit from the tailpipe. To properly fulfill this second mandate, it is necessary to understand the conditions associated with high ambient CO concentrations. The five studies summarized in this report provide information on recent CO emission inventory estimates, the meteorological conditions associated with high ambient CO concentrations, the distribution of CO concentrations within selected cities, the effects on CO concentration levels of both meteorological conditions and traffic characteristics at typical hot spot locations and the estimated amount that in-use vehicle emissions must be reduced to achieve the NAAQS for CO.

PB81-154189 PC **A02**
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
Tidal Locks Across the East River: An Engineering Solution to the Rehabilitation of Western Long Island Sound,
Malcolm J. Bowman. 1976, 16p CONTRIB-147, NOAA-80122307
Grant NOAA-2-35281
Pub. in Estuarine Processes, v1: Uses, Stresses, and Adaptation to the Estuary, 1976. Also pub. as New York Sea Grant Inst., Albany, Report No. NYSG-RR-80-13.

Water quality in western Long Island Sound and New York Harbor is seriously degraded. A major source of pollutants is sewage released into the East River, a cooscillating tidal strait connecting the sound to the harbor. Very rapid and significant improvements in water quality could be attained by constructing ship locks across the Upper East River to increase the circulation of the sea through the harbor and sound. Simple models indicate that the concentration of conservative contaminants in the sound and the harbor would drop within a month of operation. The accompanying decreases in inorganic nutrient concentrations are calculated and tabulated for both winter and summer conditions.

PB81-154213 PC **A04**/MF **A01**
Iowa Dept. of Environmental Quality, Des Moines. Air and Land Quality Div.
Iowa Air Quality Report, 1979.
Annual rept.

Jul 80, 67p
See also report for 1978, PB80-116163.

Iowa's air monitoring data from 1957 to 1979 have been compiled in this report for seven pollutants monitored in the State: suspended particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide, hydrocarbons, ozone and lead. The data are presented in tabular form for each pollutant. Additional sections discussing the pollutants and pollutant sources, the air monitoring network, and the analysis of data and trends have been added.

PB81-154296 PC **A11**/MF **A01**
Urban Systems Research and Engineering, Inc., Cambridge, MA.
An Institutional Assessment of the Implementation and Enforcement of the Clean Air Act: Florida Case Study.
Draft rept.,
James F. Hudson, and Richard C. Innes. 15 Oct 80, 246p AQ-9130-19A
Contract 19A-AQ-9130
Prepared in cooperation with HMM Associates, Waltham, MA.

This report examines and evaluates the capabilities and effectiveness of the institutions charged with enforcing the Clean Air Act requirements in the state of Florida. Among the sections of the Act addressed are those dealing with Federal grants (Sections 105 and 175), designation and planning (Sections 107 and 110), enforcement issues (Sections 113, 114 and 120), and citizen suits (Section 304). The Title I, Part D requirements for nonattainment areas are reviewed extensively. This evaluation is part of a larger effort to aid the National Commission on Air Quality in assessing the ability of various levels of government to develop, implement, and enforce air quality management strategies in response to the requirements of the Act. Case studies are also underway in Puget Sound, Washington; Houston, Texas; the Pittsburgh, Pennsylvania to Youngstown, Ohio area; and the Eastern Tennessee River Valley of Alabama and Tennessee. A summary report will integrate the findings of these five studies.

PB81-154650 PC **A06**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Ein Programmsystem zur verkehrsabhaengigen Signalsteuerung nach dem Verfahren der Signalprogrammbildung (PBIL) (PBIL - A Program System for Traffic Actuated Control According to the Method of Signal Program Generation).
Issue no. 240,
Hans-Guenther Schmidt. 1977, 118p
Text in German.

The PBIL program system is the result of a series of research projects the objective of which was the development and use of optimization models for traffic control at intersections with traffic signal controllers. In order to make general use of the PBIL program system, which operates according to the method of signal program generation, a reprogramming with division of the system into free adaptable modules was carried out, including a detailed documentation. This includes a data description, a data flow diagram, brief descriptions of program modules, flow charts as well as a program listing. By way of illustration, the program system was used in a process control computer of the SIEMENS VSR 16000 traffic computer generation. For this purpose and in view of improving operating comfort and minimizing storage and computer time, the data format was changed to meet the requirements of the computer used. In the directions for operators for this program system, the traffic engineering requirements and criteria for use, the process of data handling, the data supply, and the implementation of the program system are summarized. The data obtained thus far make it possible to apply the method by means of a widely used type of computer and/or prepare program modules for other types of computer and computer configurations.

PB81-154676 PC **A05**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Einfluss von Park-and-Ride-Anlagen auf die Verkehrsaufteilung und zweckmaessige Lage von Park-and-Ride-Plaetzen (Influence of Park and Ride Installations on Traffic Distribution and Appropriate Location of Park and Ride Sites).
Issue no. 221,
Helmut Grossmann. 1977, 83p
Text in German.

To begin with, a system-related analysis is carried out to point out the manifold dependencies, interconnections, and feedbacks between P + R transport on the one hand and private car and public transportation, supply situation, land use pattern and user behavior on the other. Models, suitable for the quantification of P + R transport, are formulated and their applicability is discussed with respect to different marginal conditions. A main component of this paper is the determination of the characteristic values determining the volume of P + R transport. The quantitative dependencies of P + R transport volumes are analyzed using the traffic region of Hamburg as an illustration. Thorough test computations are followed by the selection of regression models. These models permit a good interpretation of the operating mechanism between P + R transport and structural data on the one hand and data on public and private car transportation on the other, although the models are simply structured.

PB81-154684 PC **A08**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Untersuchungen ueber Unfallraten in Abhaengigkeit von Strassen-und Verkehrsbedingungen ausserhalb geschlossener Ortschaften. Untersuchung der Unfaelle mit Personenschaeden auf Autobahnen (Investigation of the Effects of Highway and Traffic Conditions Outside Built-Up Areas on Accident Rates).
Issue no. 223,
Hans Guenter Krebs, Juergen Heinz Kloeckner, and Ekkehard Bruehning. 1977, 154p
Text in German.

The attempt was made to investigate the influence of pavement width, horizontal curve radius, gradient, sight distance, curvature and traffic volume on accidents. The principal aim was to define the accident rate and accident cost rate. Factorial variations of types of accidents, day/night and dry/wet, were carried out for each parameter. In addition to nonlinear regression equations, multiple regression equations were utilized in order to take the simultaneous effects of interrelated functions of several parameters into consideration. Accident data and design parameters compiled from about 1150 km of two-lane rural highways in the Fed. Rep. of Germany were evaluated and analyzed. It was possible to confirm and quantify the fundamental relationships between highway and design parameters and accidents, already known from several papers on this subject, for two-lane highways in the Fed. Rep. of Germany. In addition, a wealth of new relevant details was obtained.

PB81-154874 PC **A05**/MF **A01**
Department of Transportation, Washington, DC. Materials Transportation Bureau.
Annual Report of Pipeline Safety, 1978.
1978, 95p DOT/RSPA/MTB-81/1

This report consolidates the Eleventh Annual Report on the Administration of the Natural Gas Pipeline Safety Act, the Annual Report on the Administration of the Mineral Leasing Act, and a report of liquid pipeline safety activities of the Department of Transportation. The report is a summary of activity associated with pipeline safety for calendar year 1978. The report includes the year's highlights, and detailed coverage of gas and liquid pipeline failures and casualties, regulatory activity, compliance activity, federal/state cooperation and the grant-in-aid program, research and pipeline safety studies, dissemination of pipeline safety information, cooperation with other federal agencies, a summary of outstanding problems in pipeline safety, a listing of waivers granted under the Act, and a report of activity related to the Alaska pipeline.

PB81-154882 PC **A04**/MF **A01**
Department of Transportation, Washington, DC. Materials Transportation Bureau.
Annual Report on Pipeline Safety, 1979.
1979, 59p DOT/RSPA/MTB-81/02

This report is a summary of DOT activity associated with the administration of the Pipeline Safety Act of 1979 (amending the Natural Gas Pipeline Safety Act of 1968) for calendar year 1979. The report includes the year's highlights, and detailed coverage of gas and liquid pipeline failures and casualties, regulatory activity, compliance activity, federal/state cooperation and the grant-in-aid program, research studies, dissemination of pipeline safety information, a summary of outstanding problems, a listing of waivers granted under the act, and a report of activity related the construction of the Alaska Natural Gas Transportation System.

PB81-155145 PC **A10**/MF **A01**
Robert S. Kerr Environmental Research Lab., Ada, OK.
Industrial Reuse and Recycle of Wastewaters - Literature Review.
Final rept.,
John E. Matthews. Dec 80, 210p EPA-600/2-80-183

A review of the literature on reuse/recycle of wastewaters by industry is presented in this report. The principal time period reviewed was 1967-1978. A total of 912 references are cited. Since the literature on reuse/recycle is voluminous, it was impossible to include all references on the subject; however, an attempt was made to include the most prominent for nine different industrial categories. In addition, the report includes sections on industrial use of municipal wastewater, reclamation processes, and economics of water reuse/recycle.

PB81-155194 PC **A03**/MF **A01**
Water Resources Council, Washington, DC.
Review (104) of Regional Water Resource Management Plans, WRC Staff Procedures.
30 Jul 80, 32p

This document provides guidance for Water Resource Council (WRC) staff and information on the review process for river basin commissions, other regional sponsors, Federal agencies, States, and other interested parties. It contains the WRC review policy, review procedures, and the criteria to be followed by the WRC staff. An outline of a WRC review report is included with recommendations to the President.

PB81-155202 PC **A08**/MF **A01**
American Water Works Association Research Foundation, Denver, CO.
Abstracts of Technical Papers and Poster Presentations, Water Reuse Symposium Held at Washington, DC. on March 25-30, 1979,
William J. Cooper. 1979, 156p NSF/RA-790555
Grant NSF-PFR78-21313
Sponsored in part by Office of Water Research and Technology, Wshington, DC., Army Medical Research and Development Command, Washington, DC., Environmental Protection Agency, Washington, DC., and Water Pollution Control Federation, Washington, DC.

This document consists of 150 abstracts of technical papers and poster presentations dealing with the topic of water reuse. Titles include: Applied science and its role in addressing problems relating to renovation and reuse of water; Department of Defense involvement in water reuse; The President's national water policy in relation to water reuse; Reclamation of secondary effluent for high-quality industrial reuse in Saudi Arabia; and Hygienic aspects of the dispersion of the enteric bacteria and viruses by sprinkled irrigation of wastewater.

PB81-155293 PC **A99**/MF **A01**
Southern Research Inst., Birmingham, AL.
Electrostatic Precipitator Technology Assessment: Visits in Japan, November 1977 - Appendices.
Final rept. Nov 77-Apr 78,
Grady B. Nichols. Jun 78, 700p EPA-600/7-78-110A
Contract EPA-68-02-2610
See also PB-298 389.

The report gives results of a particulate control technology assessment visit to Japan by a team of U.S. investigators. The visit included discussions

with personnel from universities, industries, and other major installations involved with particulate control. Significant research activities were noted in both the academic and industrial sectors related to particulate control and measurements. The report summarizes results of the individual discussions, observations during the tour, and discussions of technical papers. Many valuable technical papers supplied to the U.S. team are reproduced in the Appendix of the report.

PB81-155327 PC **A23**/MF **A01**
Southwest Research Inst., San Antonio, TX.
Characterization of Emissions from Motor Vehicles Designed for Low N0x Emissions.
Final rept. Mar 77-Jun 80,
Lawrence R. Smith. Aug 80, 545p EPA-600/2-80-176
Contract EPA-68-02-2497

Tailpipe emissions were characterized for four advanced low NOx catalyst equipped passenger cars under a variety of cyclic driving conditions. All of the vehicles had three-way catalysts, three with feedback carburetors and exhaust gas recirculation, and two with oxidation catalysts following the three-way catalysts. The emission rates of several unregulated pollutants including aldehydes, organic amines, sulfur dioxide, nitrous oxide, several individual hydrocarbons (including benzene), hydrogen sulfide, cyanide, organic sulfides, nickel carbonyl, ammonia, sulfate, trace metals, and N-nitrosodimenthylamine were determined. Additionally, the emission rates of the regulated pollutants, total hydrocarbons, carbon monoxide, and oxides of nitrogen were determined along with carbon dioxide and oxygen. Using three test fuels of varying sulfur content, the emissions were examined at an initial mileage and at 5,000-mile intervals to 15,000 miles. Using a toxicity criteria, the most significant emissions were the currently regulated pollutants; sulfate was the most significant unregulated pollutant. Using commuter exposure models, exposures less than 0.07 OSHA 8-hour Threshold Limit Values are projected for typical congested freeway situations.

PB81-155863 PC **A05**/MF **A01**
National Swedish Environment Protection Board, Stockholm.
Water Protection in Sweden.
Apr 77, 80p SNV-PM-841-E

The report surveys the water pollution situation found in Sweden's lakes and coastal waters. It discusses the protection of industrial and municipal water supplies and economic planning for control of pollutants.

PB81-156408 PC **A06**/MF **A01**
Woodward-Clyde Consultants, San Francisco, CA.
Development of a Network Optimization System. Volume 2.
Final rept. May 78-May 80,
R. Kulkarni, K. Golabi, F. Finn, and E. Alviti. May 80, 114p 60351B, FHWA/AZ-80/155B
Sponsored in part by Arizona Dept. of Transportation, Phoenix. See also PB81-130494.

A network optimization system (NOS) was developed to assist the Arizona Department of Transportation (ADOT) establish statewide pavement rehabilitation policies. This completes the final phase in development of a pavement management system for the ADOT. The NOS provides a systematic, consistent and theoretically sound method for determining the most cost-effective rehabilitation actions for different roadways in the state to achieve and maintain desired performance standards. This report describes the development of the optimization algorithm used in the NOS, testing of the NOS with illustrative examples and an assessment of the results of the illustrative examples, and includes a discussion of whether the NOS could be implemented by the ADOT.

PB81-156705 PC **A21**/MF **A01**
Environmental Protection Agency, Washington, DC. Office of Water Program Operations.
Aquaculture Systems for Wastewater Treatment: Seminar Proceedings and Engineering Assessment.
Technical rept.
Sep 79, 490p EPA-430/9-80-006, EPA/MCD-67

This publication contains an engineering assessment and the proceedings of a seminar held at the University of California-Davis on September 11-12, 1979, on the use of aquatic systems for the treatment of municipal wastewater. Case studies drawn from throughout the United States are used to illustrate the engineering, design, operation, and management of various wastewater aquaculture systems, including projects involving wetlands processes, aquatic plant processes, and combined aquatic processes.

PB81-158727 PC **A04**/MF **A01**
Geological Survey, Carson City, NV. Water Resources Div.
Water Resources of the Walker River Indian Reservation, West Central Nevada.
Open file rept.,
Donald H. Schaefer. Dec 80, 67p OFR-80-427, EDA-81-013
Grant EDA-07-6-01832

This study was conducted to appraise the ground- and surface-water resources of the Walker River Indian Reservation. The suitability of drilling new stock and irrigation wells on sites selected by the Walker River Paiute Tribe was determined. Increasing interest in expanding the livestock and agricultural operations on the Walker River Indian Reservation has prompted the Walker River Paiute Tribe to have the water resources of the reservation appraised and proposed sites for new wells evaluated.

PB81-161200 PC **A05**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part A: Effects of Trail Bridges. Volume 1: Introduction, Summary and Recommendations.
Final rept.
Jun 78, 99p AID-PN-AAG-446
See also Part A, Volume 2, PB81-161218.
Also available in set of 7 reports PC E99, PB81-161192.

This volume presents an overview of an extensive study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study report as a whole is divided into three parts with seven total volumes, of which this is the first. The four remaining volumes in Part A contain case histories of thirteen trail bridges constructed under former USAID projects between 1956 and 1975; the volume comprising Part B discusses the study of traditional suspended bridges built with local initiative and technology in the District of Baglung; and the one volume of Part C presents an annotated bibliography and general information on trail bridges and trails in Nepal. The present volume first sets out the study's objectives and methodology, the latter relying heavily on opinion polls of local penchayat people and government officials, school teachers, porters, traders, and common rural folk. A general discussion of trail bridge construction in Nepal and of the socioeconomic background of the rural hills people precedes the report summary and recommendations.

PB81-161218 PC **A09**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part A: Effects of Trail Bridges. Volume 2: Case History, Analysis and Findings on Bridges Studied in Central Development Region.
Final rept.
Jun 78, 192p AID-PN-AAG-447
See also Part A, Volume 1, PB81-161200 and Part A, Volume 3, PB81-161226.Portions of this document are not fully legible.
Also available in set of 7 reports PC E99, PB81-161192.

This is the second volume of an extensive final report describing a study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study as a whole was a reaction to the confusion, lack of integration with other development projects, and lack of thought to the social and political aspects of development which have characterized earlier USAID suspension bridge projects in Nepal. These efforts have not proven entirely successful and, on occasion, have even resulted in the misplacement of bridges, with the inevitable consequences of minimal benefits. This volume contains case studies of former USAID trail bridge projects in the Central Development Region of Nepal, including the Karambot, Syabrubesi, Kagune, and Pachuwarghat bridges. The volume is divided into four sections, one for each case study. Each contains an area description and history (including the bridge location history and selection process); analysis and findings of the socio-anthropological, institutional, and economic impact studies, as well as those of the engineering investigations; and illustrative photographs.

PB81-161226 PC **A08**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part A: Effects of Trail Bridges. Volume 3: Case History, Analysis and Findings on Bridges Studied in Western Development Region.
Final rept.
Jun 78, 153p AID-PN-AAG-448
See also Part A, Volume 2, PB81-161218 and Part A, Volume 4, PB81-161234.Portions of this document are not fully legible.
Also available in set of 7 reports PC E99, PB81-161192.

This is the third volume of an extensive final report describing a study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study as a whole was a reaction to the confusion, lack of integration with other development projects, and lack of thought to the social and political aspects of development which have characterized earlier USAID suspension bridge projects in Nepal. These efforts have not proven entirely successful and, on occasion have even resulted in the misplacement of bridges, with the inevitable consequences of minimal benefits. This volume contains case studies of former USAID trail bridge projects in the Western Development Region of Nepal, including the Darondi, Manbagh, and Jhaprebagar bridges. The volume is divided into three sections, one for each case study. Each contains an area description and history (including the bridge location history and selection process); analysis and findings of the socio-anthropological, institutional, and economic impact studies as well as those of the engineering investigations; and illustrative photographs.

PB81-161234 PC **A08**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part A: Effects of Trail Bridges. Volume 4: Case History, Analysis and Findings on Bridges Studied in Far Western Development Region.
Final rept.
Jun 78, 161p AID-PN-AAG-449
See also Part A, Volume 3, PB81-161226 and Part A, Volume 5, PB81-161242.Portions of this document are not fully legible.
Also available in set of 7 reports PC E99, PB81-161192.

This is the fourth volume of an extensive final report describing a study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study as a whole was a reaction to the confusion, lack of integration with other development projects, and lack of thought to the social and political aspects of development which have characterized earlier USAID suspension bridge projects in Nepal. These efforts have not proven entirely successful and, on occasion, have even resulted in the misplacement of bridges, with the inevitable consequences of minimal benefits. This volume contains case studies of former USAID trail bridge projects in the Far Western Development Region of Nepal, including the Bhingri, Sanfebagar, and Malumela bridges. The volume is divided into three sections, one for each case study. Each contains an area description and history (including the bridge location history and selection process); analysis and findings of the socio-anthropological, institutional, and economic impact studies, as well as those of the engineering investigations; and illustrative photographs.

PB81-161242 PC **A07**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part A: Effects of Trail Bridges. Volume 5: Case History, Analysis and Findings on Bridges Studied in Eastern Development Region.
Final rept.

Jun 78, 142p AID-PN-AGG-450
See also Part A, Volume 4, PB81-161234 and Part B, PB81-161259.
Also available in set of 7 reports PC E99, PB81-161192.

This is the fifth volume of an extensive final report describing a study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study as a whole was a reaction to the confusion, lack of integration with other development projects, and lack of thought to the social and political aspects of development which have characterized earlier USAID suspension bridge projects in Nepal. These efforts have not proven entirely successful and, on occasion, have even resulted in the misplacement of bridges, with the inevitable consequences of minimal benefits. This volume contains case studies of former USAID trail bridge projects in the Eastern Development Region of Nepal, including the Toxelghat and Turkeghat bridges and the Leguwaghat cableway. The volume is divided into three sections, one for each case study. Each contains an area description and history (including the bridge/cableway location history and selection process); analysis and findings of the socio-anthropological, institutional, and economic impact studies, as well as those of the engineering investigations; and illustrative photographs.

PB81-161259 PC **A05**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part B: Baglung District Bridge Construction Study.
Final rept.
Jun 78, 78p AID-PN-AAG-451
See also Part A, Volume 5, PB81-161242 and Part C, PB81-161267.Portions of this document are not fully legible.
Also available in set of 7 reports PC E99, PB81-161192.

This is the sixth volume of an extensive final report describing a study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study as a whole was a reaction to the confusion, lack of integration with other development projects, and lack of thought to the social and political aspects of development which have characterized earlier USAID suspension bridge projects in Nepal. These have not been entirely successful and, on occasion, have even resulted in the misplacement of bridges, with the inevitable consequences of minimal benefits. This volume contains an examination of traditional suspended bridges built with local initiative and technology in the District of Baglung. Forty such bridges were completed and commissioned for use during the period 1975-1978. At the time of the study, this was the only instance of such a large-scale, organized bridge-building effort undertaken with local initiative and government participation in Nepal, and as such had created widespread interest throughout the country and in foreign agencies like USAID, the United Nations Development Program, the German Embassy, and others. This Baglung District study utilized the case study approach and was based primarily on a review of relevant Nepalese government documents, inspections of bridge locations, and interviews with government officials, panchayat workers, school teachers and local people. The study report is divided into sections containing an introduction and purpose statement, methodology, case history in brief, the socioeconomic background of the district, technology and project background, analysis, and a summary and recommendations. The major conclusion is that this type of local initiative and participation should be encouraged and supported by the Government, which should immediately initiate this type of program on an experimental basis in other neighboring districts.

PB81-161267 PC **A04**/MF **A01**
East Consulting Engineers, Kathmandu (Nepal).
Trail Suspension Bridge Study. Part C: Annotated Bibliography and General Informations on Trail Bridges and Trails in Nepal.
Final rept.
Jun 78, 51p AID-PN-AAG-452
See also Part B, PB81-161259.Portions of this document are not fully legible.
Also available in set of 7 reports PC E99, PB81-161267.

This is the seventh and final volume of an extensive final report describing a study to develop a set of criteria for the selection of trail suspension bridge sites in Nepal. The study as a whole was a reaction to the confusion, lack of integration with other development projects, and lack of thought to the social and political aspects of development which have characterized earlier USAID suspension bridge projects in Nepal. These efforts have not been entirely successful and, on occasion, have even led to the misplacement of bridges, with the inevitable consequences of minimal benefits. This volume contains a 59-item annotated bibliography (1960s and 1970s) on trail bridges and trails in Nepal, consisting mainly of guidebooks/atlases, bridge project feasibility studies and progress reports, socioeconomic studies, civil engineering studies and manuals, and government development plans. General information concerning related Nepalese and foreign institutions; engineers, technicians and other persons who have knowledge of the trail bridge construction projects; steel fabricators; and trekking agencies in Kathmandu is also included. A list of abbreviations used in preparing the report is appended.

PB81-165011 PC **A05**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Roads and the Environment.
c1980, 95p TRRL-SUPLEMENTARY-536
Also pub. as ISSN-0305-1315.

Contents: Some research into the environmental impact of roads and traffic; Traffic noise; Road construction noise; Vibration and low frequency sound; Exhaust emission; Assessment methods and surveys; Assessing the visual impact of roads; Before and after studies; and Lorry nuisance.

PB81-165037 PC **A04**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Methods of Forecasting Kilometres Per Car,
J. C. Tanner. c1981, 59p TRRL-LR-968
Also pub. as ISSN-0305-1293.

The object of the report is to reconsider the methods used to forecast kilometers per car at an average national level. Such forecasts are used as an input to the national traffic forecasts. The first part gives various sets of time-series and cross-section data and draws certain conclusions about the effects of incomes, petrol prices and car speeds. A simple constant-elasticity model is then developed; it is used to illustrate the effects of a range of assumptions about the future. An alternative model of car ownership and use is then proposed. This has a disaggregate causal structure and uses ideas of utility maximization and constant travel budgets. The forecasts from both models cover a wide range; at the center of the range of the assumptions, they indicate little change in kilometers per car up to the year 2010. It is concluded that at its present stage of development the causal model is less satisfactory than the simple model. (Copyright (c) Crown Copyright 1981.)

PB81-165052 PC **A03**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Extending the Bridge Maintenance Painting Season,
M. A. Winnett. c1980, 35p TRRL-LR-960
Also pub. as ISSN-0305-1293.

Current codes, if rigidly enforced, preclude highway bridge painting on site throughout the winter and much of the spring and autumn in an average year. The temperature must be not less than 4C and the relative humidity not above 90 per cent. As the real criterion is to avoid painting on wet surfaces, a change of emphasis away from relative humidity measurements is suggested. A simple wetness detector has been developed using the principle of a resistance change between two electrodes in the presence of moisture. The complete system enabling readings of surface wetness, air and surface temperatures was installed at various bridge and experimental sites for a period of three years. The results show that the painting season for some structures can be economically extended to the period of March through until the end of October. (Copyright (c) Crown Copyright 1980.)

PB81-165102 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Noise from Urban Traffic under Interrupted Flow Conditions,
D. Gilbert, L. Moore, and S. Simpson. c1980, 25p TRRL-SUPPLEMENTARY-620
Also pub. as ISSN-0305-1315. Prepared in cooperation with Imperial Coll. of Science and Technology, London (England).

Previous attempts to determine an accurate prediction equation for L10 noise levels arising from interrupted traffic flows have not been entirely successful. Either the prediction equations were too complex or the errors of prediction were too large. This work has attempted to extend these previous studies to identify more accurately the important variables governing the generation and propagation of noise from interrupted flows in urban streets in London and thereby reduce systematic and random errors of prediction. The first stage of this new study concentrated on establishing the effect on L10 noise levels of the traffic related variables by constraining inter-site differences in street layout and other propagation features. In the second stage of the study the propagation of noise from the road source was examined together with reflection effects from buildings and the influence of layout geometry. It was found that L10 was primarily determined by the total volume of traffic and the proportion of different classes of vehicles in the traffic stream. It was found necessary to introduce a three tier classification of the vehicle population rather than two as is common practice when calculating L10 levels from freely flowing traffic. The final prediction equation is expressed in terms of easily obtainable variables and is significantly more accurate than the present Department of the Environment method (Calculation of Road Traffic Noise) in predicting noise levels in interrupted traffic flow situations. (Copyright (c) Crown Copyright 1980.)

PB81-173676 PC **A03**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 8. Analysis of Driver Requirements for Intracity Trips.
Final rept. Jun 74-Feb 78,
J. D. Carvell, and R. H. Whitson. Feb 78, 34p
FHWA-RD-78-12
Contract DOT-FH-11-8505
See also Volume 9, PB81-173684.

The primary objective of this report is to document a systems analysis conducted to determine driver information requirements for intracity trips in freeway corridors when incidents occur on the freeway. The analysis begins with the pre-trip planning a driver goes through; the decisions which he makes during his trip; and the decisions he makes at his destination.

PB81-173684 PC **A09**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 9. A Study of Physical Design Requirements for Motorist Information Matrix Signs.
Final rept. Jun 74-Feb 78,
C. J. Messer, W. R. Stockton, J. M. Mounce, D. A. Andersen, and J. M. Turner. Feb 78, 193p
FHWA-RD-78-13
Contract DOT-HS-11-8505
See also Volume 10, PB81-173692.

The purpose of this study was to identify the physical design requirements of changeable message lamp matrix signs. Design characteristics addressed include sequential and run-on displays, message length, words per line, number of lines, display rates, legibility, bulb loss, and symbolic substitution. Effects of driver workload were also addressed. The studies were conducted first in a laboratory equipped with a rear projection screen and subject response controls. Slides and motion picture film were used with controlled exposures to obtain subject responses. Percent correct response was the evaluation criterion for all variables except symbolic substitution which related to association. Selected laboratory results were subjected to limited field validation in a controlled driving environment. The field studies considered subject performance under both 'unloaded' and 'loaded' conditions.

PB81-173692 PC **A16**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 10. Human Factors Evaluation of Traffic State Descriptor Variables.
Final rept. Jun 74-Feb 78,
C. L. Dudek, R. D. Huchingson, R. J. Koppa, and M. L. Edwards. Feb 78, 352p FHWA-RD-78-14
Contract DOT-HS-11-8505
See also Volume 11, PB81-173700.

The document summarizes the laboratory research findings in eight topic areas dealing with message design criteria associated with traffic state descriptors. Several of the studies were replicated in different regions of the United States. The research objectives dealt with issues of content, format and associated understanding of messages. Among the issues explored were minimum traffic state information requirements; traffic state descriptors; traffic state coding; location and length of congestion; lane blockage descriptors; incident types; and temporal information.

PB81-173700 PC **A13**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 11. Human Factors Evaluation of Route Diversion and Guidance Variables.
Final rept. Jun 74-Feb 78,
R. D Huchingson, C. L. Dudek, M. L. Edwards, and R. J. Koppa. Feb 78, 300p FHWA-RD-78-15
Contract DOT-HS-11-8505
See also Volume 12, PB81-173718.

The document summarizes the laboratory research findings in nine topic areas dealing with message design criteria associated with route diversion and guidance. Several of the studies were replicated in different regions of the United States. The research objectives dealt with issues of content, format, and associated understanding of messages to be displayed both on static signs and changeable message signs (CMS). Among the issues explored were advanced signing upstream of an advisory CMS for diversion; understanding of major point diversion sign coding; the content and format of the advisory CMS message for diversion and secondary verbal messages for route assurance; the meaning conveyed by names given to the diversion route; techniques for guidance to multiple destinations and major generators and for guidance when the driver has passed the correct turn; and, finally, regional differences in names for frontage roads and freeways going around or to one side of a city.

PB81-173718 PC **A10**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 12. Supplement to Traffic State Descriptors and Route Diversion and Guidance Studies.
Final rept. Jun 74-Feb 78,
R. D. Huchingson, R. J. Koppa, M. L. Edwards, C. L. Dudek, and R. Q. Brackett. Feb 78, 212p FHWA-RD-78-16
Contract DOT-HS-11-8505
See also Volume 13, PB81-173726.

The report contains the experimental designs for the human factors laboratory studies concerned with visual modes of information presentation. Results of these studies are documented in Volumes 10 and 11.

PB81-173726 PC **A14**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 13. Human Factors Evaluation of Audio and Mixed Modal Variables.
Final rept. Jun 74-Feb 78,
R. D. Huchingson, R. J. Koppa, and C. L. Dudek. Aug 78, 325p FHWA-RD-78-17
Contract DOT-FH-11-8505
See also Volume 14, PB81-173734.

The document summarizes fifteen research studies dealing with techniques for improving low-powered radio communications and the interface between radio and visual signing modes of communication. Studies were conducted both in laboratory and in-situ research vehicles. Topics investigated were language style of radio messages; the effects of order of message elements and message load on recall of specific elements; the types of route-following errors committed with internally and successively redundant audio messages; the effects of the complexity of a diversion route on success in route following from radio instructions; a comparison of success in route following with visually-coded trail blazers and with radio route guidance; the message design of an advance road sign to direct drivers to tune their radios for traffic information; and a survey of descriptors employed by local residents in describing to visitors a diversion route around an incident.

PB81-173734 PC **A05**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 14. Point Diversion for Special Events: Field Studies.
Final rept. Jun 74-Aug 78,
Graeme D. Weaver, Stephen H. Richards, Donald R. Hatcher, and Conrad L. Dudek. Aug 78, 100p FHWA-RD-78-18
Contract DOT-HS-11-8505
See also Volume 15, PB81-173742.

The report documents route diversion field studies conducted in Dallas, Texas to validate primary candidate real-time messages and static route guidance trailblazer signs resulting from the Task B human factors laboratory studies. Included in the report are discussion of the conceptual design, the research approach, the individual methodology employed, and analysis of results.

PB81-173742 PC **A06**/MF **A01**
Texas Transportation Inst., College Station.
Human Factors Requirements for Real-Time Motorist Information Displays. Volume 15. Freeway Incident Management Field Studies.
Final rept. Jun 74-Aug 78,
James D. Carvell, John M. Turner, and Conrad L. Dudek. Aug 78, 105p FHWA-RD-78-19
Contract DOT-HS-11-8505
See also Volume 14, PB81-173734.

The report documents incident management studies conducted in Dallas, Texas to validate primary candidate real-time messages resulting from human factors laboratory studies. Messages displayed on freeway and entrance ramp changeable message signs were evaluated during incident conditions and freeway maintenance.

13C. Construction Equipment Materials, and Supplies

PB81-153447 PC **A12**/MF **A01**
South Dakota School of Mines and Technology, Rapid City. Dept. of Civil Engineering.
Superplasticized Concretes for Rehabilitation of Bridge Decks and Highway Pavements.
Phase rept. Aug 79-Jul 80,
V. Ramakrishnan, and W. V. Coyle. Jan 81, 264p SDSMT-CDT-805, DOT/RSPA/DPB-50-81/3
Contract DOT-RC-92035

The object of this research was to develop guidelines for assuring the trouble-free placement of tough, high-strength, high density, durable concrete for bridge deck construction through the use of superplasticizers and steel fibers. The study was made in two phases. The first investigated the basic properties of concrete made with superplasticizers through the use of experimental mixtures conforming to the requirements dictated by statistically valid factorial designs, so that analysis of variance could be used in the evaluation. The second phase extended the findings into an evaluation of superplasticized concretes containing steel fibers. This report describes the first phase study of the statistical evaluation of superplasticized concrete properties. Two mixes, one with medium workability and high cement content suitable for bridge deck replacement and another with high workability suitable for structural and pavement concrete were selected for intensive study. For these mixes, properties of the fresh concrete (slump, vebe time, flow table spread, air content, initial and final setting times) are reported. The effects of retempering are described. The influence of three types of cements on the properties of plastic and hardened concrete is explained. Complete results of the following tests are presented: compressive strength, tensile strength, flexural strength, static modulus of elasticity, dynamic modulus of elasticity, pulse velocity and dry unit weight at 1, 3, 28 and 90 days curing. The selected concretes had high durability and satisfactory resistance against deicer scaling.

PB81-155228 PC **A07**/MF **A01**
California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
Planar Mechanics of Fully Grouted Concrete Masonry.
Robert O. Nunn. May 80, 127p UCSD/AMES/TR-80-001, NSF/RA-800375
Grant NSF-PFR78-16581

A continuum model for the planar behavior of fully grouted concrete masonry is developed from experimental data. Both unreinforced and reinforced masonry are treated. The form of the elastic law, in values of the elastic moduli and the elastic damping constant are determined. Prism end conditions are discussed and uniaxial tensile strength direction dependence is described. A biaxial fracture law, applying when one principal stress is tensile, is presented, and a plasticity model for post-fracture behavior of reinforced masonry is developed. Normality of the plastic strain rate is shown to hold at several points on the loading surface, and a stress rate-total strain rate matrix for plastic behavior is derived. Many graphs, tables, and diagrams amplify the text.

PB81-156481 PC **A07**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
The Behavior of Bonded Doubler Splices for Composite Sandwich Panels.
Interim rept. no. 19,
Thomas A. Zeiler, and Terry A. Weisshaar. Jul 80, 140p VPI-E-80-20
Grant NGR-47-004-129

The results of an investigation into the behavior of adhesively bonded doubler splices of two composite material sandwich panels is presented. The splices are studied from three approaches: analytical; numerical (finite elements); and experimental. Several parameters that characterize the splice are developed to determine their influence upon joint strength. These parameters are: doubler overlap length; core stiffness; laminate bending stiffness; the size of the gap between the spliced sandwich panels; and room and elevated temperatures. Similarities and contrasts between these splice and the physically similar single and double lap joints are discussed. The results of this investigation suggest several possible approaches to improving the strength of the sandwich splices.

PB81-158214 PC **A99**/MF **A01**
American Association of State Highway and Transportation Officials, Washington, DC.
SPEL (Special Product Evaluation List).
Annual rept.
Dec 79, 607p FHWA/RD-80/127
See also report dated Dec 77, PB-281 890.

The document is a listing of special products which have been evaluated in some manner by State highway or transportation departments. It is intended only to provide interested governmental employees with a guide as to who has made tests on these products. The listing contains 5,337 evaluations contributed by 37 States and the FHWA.

PB81-858383 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Sandwich Structures. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Dec 80, 159p NERACIAANT2376

The citations cover global information on sandwich structures using various materials, combinations,

and different forms and shapes. Physical and environmental testing of sandwich structures are also studied. (Contains 162 citations, fully indexed and including a table of contents.)

PB81-859936 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Concrete Pipes: Manufacturing and Application. January, 1970-January, 1981 (Citations from the Engineering Index Data Base).
Rept. for Jan 70-Jan 81.
Jan 81, 84p NERACEI NT2231

This bibliography covers worldwide information on manufacturing and applications of concrete pipes for drinking, drainage, and sewage purposes. Topics include inplace casting and plastic lining of concrete pipes (Contains 96 citations, fully indexed and including a table of contents.)

13D. Containers and Packaging

DOE/ET/13511-T3 PC **A03**/MF **A01**
Westinghouse Electric Corp., Tampa, FL. Tampa Div.
Development of Automated Welding Process for Field Fabrication of Thick Walled Pressure Vessels. Fourth Quarter, FY 1980.
19 Dec 80, 43p
Contract AC05-78ET13511

Progress is reported in research on the automated welding of heavy steel plate for the fabrication of pressure vessels. Information is included on: torch and shield adaptation; mechanical control of the welding process; welding parameters; joint design; filler wire optimizaton; nondestructive testing of welds; and weld repair. (ERA citation 06:008054)

PB81-153280 Not available NTIS
National Bureau of Standards, Washington, DC.
Fracture Analysis of a Pneumatically Burst Seamless-Steel Compressed Gas Container.
Final rept.
1979, 12p
Contract DOT-AS-40034
Pub. in American Society for Testing Materials, Special Technical Publication 677, p734-745 1979.

This paper describes the fracture analysis of a seamless steel compressed gas container which burst at a reported pressure of 17.3 MPa (2500 psi) during filling. Design burst pressure was about 35.2 MPa (5100 psi). The container was made of a quenched and tempered carbon-manganese steel with yield and tensile strengths of 517 and 687 MPa (75,000 and 99,800 psi), respectively. The vessel had been in service for about 6 months and had been filled perhaps twice before it burst. The fracture origin was a pair of part-through cracks in a gouged region on the outside surface. Fracture at the origin was ductile and the fast fracture was also ductile. The empirical methodology developed at Battelle-Columbus for analyzing the burst of line pipe was utilized to analyze the ductile fracture initiation of this compressed gas container. Kaub c, J sub Ic and K sub Ic were estimated for this carbon-manganese pressure vessel steel.

13E. Couplings, Fittings, Fasteners, and Joints

N81-16242/2 PC **A04**/MF **A01**
European Space Agency, Paris (France).
The Diffusion of Water Vapor in Humid Air into the Bondlines of Adhesively Bonded Metal Joints.
W. Althof. Jun 80, 53p ESA-TT-619, DFVLR-FB-79-06
Transl. into English of "Die Diffusion des Wasserdampfes der Feuchten Luft in die Klebschichten von Metallklebungen", Dfvlr-FB-79-06, Brunswick, Feb. 1979 79 p. Original Report in German Previously Announced as X80-75013. Original German Report Available from Dfvlr, Cologne Dm 15,40.

The moisture content of five aircraft structural adhesives as a function of time and environmental conditions was determined by weighing bulk adhesive material specimens and bonded-joint specimens before and after exposure to six test environments. The diffusion coefficient was calculated according to Fick's law. The functional relationship between the moisture content of the adhesive at saturation and the atmospheric humidity was calculated. Formulae are given for calculating the moisture distribution in a glueline; control tests confirmed that the formulae are applicable, provided the adhesive remains unchanged by the environment.

13F. Ground Transportation Equipment

AD-A094 734/1 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Electric Vehicle Simulation for Design Optimization.
Master's thesis,
Kenneth A. Stafford. Dec 80, 119p Rept no. AFIT/GAE/AA/80D-19

Currently available electric passenger vehicles have revealed a lack of design sophistication that has highlighted the need for an accurate method of forecasting performance. An electric vehicle computer simulation program was developed to satisfy that need. The approach was to establish a very comprehensive and flexible vehicle model and simulate its operation on a realisitc driving cycle. The driving cycle selected was the Federal Urban Driving Sequence. A thorough vehicle model was established that incorporates aerodynamic drag, rolling resistance, both rotational and translational inertial effects, and component by component dynamic power train efficiencies. Battery discharge performance is tracked by a fractional-utilization algorithm with corrections for short-term discharge effects. The simulation compares required power obtained from the driving cycle speed schedule and vehicle model characteristics with the available power at the motor for each time increment of the driving cycle to compute battery fraction used and deviation from the speed schedule when available power is insufficient. These results of the simulation can be used to evaluate an existing vehicle's performance, or, if desired, to develop vehicle parameters to obtain a specified performance level.

AD-A095 130/1 PC **A03**/MF **A01**
Frank J. Seiler Research Lab., United States Air Force Academy, CO.
The USAF Academy Flywheel-Electric Car Technical Report.
Rept. no. 2 (Final) 31 May 79-31 Dec 80,
Robert G. Schwein, Jr. Dec 80, 36p Rept no. FJSRL-TR-80-0025
See also Rept. no. FJSRL-TR-79-0006, AD-A071 242.

This is the second and final report on the USAF Academy Flywheel-Electric Car. The car is an operational test vehicle, not a prototype for a commercial car. It weights 3100 pounds, carries 4 passengers, and cruises at 40 miles-per-hour for about 100 miles before recharging. Technical details are presented that will provide guidance to the reader who wishes to construct a similar vehicle. (Author)

N81-16955/9 PC **A04**/MF **A01**
Kansas Univ./Center for Research, Inc., Lawrence.
An Investigation of Drag Reduction for Tractor Trailer Vehicles with Air Deflector and Boattail.
Final Report.
V. U. Muirhead. Jan 81, 68p NASA-CR-163104, KU-FRL-406-1
Grants NSG-4021, NSG-4023

A wind tunnel investigation was conducted to determine the influence of several physical variables on the aerodynamic drag of a trailer model. The physical variables included: a cab mounted wind deflector, boattail on trailer, flow vanes on trailer front, forced transition on trailer, and decreased gap between tractor and trailer. Tests were conducted at yaw angles (relative wind angles) of 0, 5, 10, 20, and 30 degrees and Reynolds numbers of 3.58 x 10 to the 5th power 6.12 x 10 to the 5th power based upon the equivalent diameter of the vehicles. The wind deflector on top of the cab produced a calculated reduction in fuel consumption of about 5 percent of the aerodynamic portion of the fuel budget for a wind speed of 15.3 km/hr (9.5 mph) over a wind angle range of 0 deg to 180 deg and for a vehicle speed of 88.5 km/hr (55 mph). The boattail produced a calculated 7 percent to 8 percent reduction in fuel consumption under the same conditions. The decrease in gap reduced the calculated fuel consumption by about 5 percent of the aerodynamic portion of the fuel budget.

PB81-141707 PC **A06**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Spurwechselvorgaenge auf zweispurigen BAB - Richtungsfahrbahnen (Weaving Movements on Two-Land Motorway Roadways).
Issue no. 263,
Udo Sparmann. 1978, 125p
Text in German.

This investigation is a study of voluntary weaving movements on two-lane motorway roadways under conditions of uninterrupted flow. The movements are studied both microscopically and macroscopically. Information on movement and position characteristics of vehicles participating in weaving was obtained from a series of induction loops placed in a sequence. Four types of weaving by changing over to the left lane and two types of weaving by changing over to the right lane were distinguished. In order to determine the relationships among the variables, multiple regression analyses were carried out. A relationship was found to exist between weaving behavior and lane configuration. On the passing (left) lane, the gaps accepted are considerably shorter than those on the shoulder (right) lane thus causing the well-known phenomenon of nonuniform lane utilization under high volume conditions. Moreover, weaving movements involve a high potential of danger to multilane traffic flow. The maximum of weaving movements was estimated at a total of 600 weaving movements per hour and kilometer at a traffic volume of 2,000 veh./h. In addition, the frequency of passing was also included into the consideration and related to the frequency of weaving. It turned out that, also under low volume conditions, passing generally means overtaking more than one vehicle at a time. The relationship pattern found has been used to define weaving behavior for a model to simulate traffic flow.

PB81-141715 PC **A09**/MF **A01**
Bundesministerium fuer Verkehr, Bonn-Bad Godesberg (Germany, F.R.). Abt. Strassenbau.
Systemtheoretische Erfassung des Guterverkehrs zum Zwecke seiner expliziten Berucksichtigung in Verkehrsplanungsprozessen (A Systems Analysis for Freight Transport with a View to Its Explicit Consideration in Transportation Planning Processes).
Issue no. 237,
Hans-Guenther Schmidt. 1977, 188p
Text in German.

A method is developed which enables to deal with freight transport as a separate component of overall transport within the general frame of transport planning. Freight transport follows specific rules and makes specific requirements on transport facilities. The planning procedure developed consists of the following functional elements: generation of the quantities of goods to be dispatched and received, classified according to categories of goods; distribution of the quantities of goods to be dispatched and received among the modes of transportation (modal split), according to affinities and qualities of accessibility; balancing of dispatch and receipt potentials by means of freight traffic, differentiated according to types of goods and modes of transportation; quantification of required transport capacities in order to evaluate freight traffic taking loading density, transport space utilization, and share of empty runs into account; quantification of vehicle requirements on the basis of the necessary transport capacity; relation of cal-

culated numbers of vehicles to a dimensioning time interval; and assignment of vehicle streams to a transport network.

PB81-153611 PC **A03**/MF **A01**
National Telecommunications and Information Administration, Boulder. CO. Inst. for Telecommunication Sciences.
Measurements of Electromagnetic Noise Radiated from Automotive Ignition Systems.
Technical rept.,
Robert J. Matheson. Nov 80, 40p NTIA-REPORT-80-54

Measurements of the amplitude probability distributions and the average crossing rates of the electromagnetic noise radiated by automotive ignition systems were made at 30 MHz, 47 MHz, 147 MHz, 224 MHz and 445 MHz. The ignition noise from a single car and a 12-car matrix were each measured in a 10 kHz bandwidth, using a field-intensity meter, a DM-4, a desktop calculator, and an X-Y plotter. The DM-4 is an instrument built by NTIA to measure amplitude probability distributions and average crossing rates. Numerical integration of the amplitude probability distributions was used to determine the rms, the average, and the average logarithm of the envelope of the measured noise.

PB81-153785 PC **A03**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Test and Evaluation Branch.
Exhaust Emissions from Twenty Light Duty Diesel Trucks.
Technical rept.,
John C. Shelton. Aug 80, 29p EPA-AA-TEB-80-20

This paper describes the results of an exhaust emission testing program conducted for EPA by Automotive Testing laboratories. Twenty diesel-powered light-duty trucks were tested. Gross vehicle weight ratings for these trucks ranged from 5300 to 6200 lbs. The primary purpose of this program was to provide data to establish emission factors for light duty diesel-powered trucks. Secondary objectives included an assessment of the emission durability of the engines and an evaluation of fuel economy. The test vehicles were randomly selected from the general public in the St. Louis area using direct appeals to individual owners and referrals from other test participants. The test sequence included the Federal Test Procedure, the Highway Fuel Economy Test and several short tests. Mass emissions were also measured during individual steady state and transient modes of operation. The work was conducted during March and April of 1980. The average emission test results were very low and similar to those from diesel engines in passenger cars. It appears that diesel engines in light duty truck service demonstrate virtually no emission deterioration while in-use over their 'useful life' although two engines required major engine rebuilding before 50,000 miles.

PB81-153793 PC **A02**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Test and Evaluation Branch.
Evaluation of the Stone Industrial Corporation Copper-Plated Combustion Chamber Concept.
Technical rept.
Jul 73, 7p EPA-AA-TEB-74-5

Stone Industrial Corporation of College Park, Maryland, has had a long-term development project related to a copper-plated combustion chamber concept for reciprocating internal combustion engines. A majority of their experience with this concept has been with Diesel engines. Their work has shown reduction in Diesel smoke levels and some improvement in fuel economy. As an extension of this effort and to investigate the effect of their copper-plated combustion chamber concept in a light duty automotive application, Stone prepared two gasoline-powered vehicles. The Emission Control technology Division was contacted by Stone in regard to conducting confirmatory testing on these vehicles. Emissions data from these vehicles presented by Stone demonstrated the potential of achieving low levels of all three emissions. Thus, test work was undertaken by the Test and Evaluation Branch.

PB81-153801 PC **A02**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Test and Evaluation Branch.
Effects of FID (Flame Ionization Detector) Oven and Sample Line Temperature on the Measurement of Hydrocarbon Emissions from Gasoline Engines.
Technical rept.
Jul 73, 7p EPA-AA-TEB-74-7

The Test and Evaluation Branch of the Emission Control Technology Division has completed an in-house program to determine the effects of oven and sample line temperature of a Flame Ionization Detector (FID) on the measurement of hydrocarbon (HC) emissions from light duty Diesel vehicles (Report No. 73-26). Since significantly different results were found when measuring hydrocarbon emissions from Diesel engines using a heated FID as compared to the CVS (Constant Volume Sampler) 3-bag method, it was felt that a similar study should be made for light duty gasoline engines.

PB81-153819 PC **A02**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Test and Evaluation Branch.
Evaluation of the SCATPAC Device.
Technical rept.
Jul 73, 6p EPA-AA-TEB-74-6

The ECT Division was contacted by a representative of Cedar Rapids Engineering Company, of Cedar Rapids, Iowa, concerning their retrofit device for automobiles called SCATPAC. After being shown test results performed by Olson Laboratories which showed significant reductions of CO, HC, and NOx on a vehicle with the device installed (as compared to baseline), the ECTD agreed to perform testing of the device on an EPA owned vehicle.

PB81-153827 PC **A02**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Test and Evaluation Branch.
Evaluation of the Hydro-Catalyst Corporation Pre-Combustion Catalyst.
Technical rept.
Jul 73, 7p EPA-AA-TEB-74-4

Hydro-Catalyst Corporation of Colts Neck, New Jersey, contacted the Environmental Protection Agency and requested an evaluation of their pre-combustion catalyst. Data was presented from Scott Laboratories compiled using a 1972 Cadillac Eldorado. The results of this testing illustrated good CO control with possible NOx reduction. An evaluation of this device was initiated by the Test and Evaluation Branch.

PB81-153975 PC **A03**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Fire Protection Systems for Rail Transportation of Class A Explosives: Interim Report.
Richard W. Bukowski. Nov 80, 35p NBSIR-80-2170
Sponsored in part by Federal Railroad Administration, Washington, DC.

As a result of several accidents involving fire induced detonation of military explosives during rail shipment, a research project, funded by the Federal Railroad Administration (FRA), was initiated at the Center for Fire Research (CFR) at the National Bureau of Standards (NBS). This project was initiated to evaluate various methods of protection of Class A explosives from fire, and to identify one or more cost-effective approaches which could be explored in greater detail in later studies. Active systems (detection, notification, and extinguishment) and passive systems (thermal insulating barriers) were evaluated regarding cost, feasibility and level of protection provided for the major hazard scenarios involved in rail shipment of explosives. The passive, thermal barrier approach was selected as the most reliable and less costly of the options studied while providing an acceptable level of protection. Small-scale and full-scale tests were conducted to obtain performance data on one specific thermal barrier material. Based on this data, a computer model was developed which can predict temperatures of the boxcar floor, top surface temperature of a thermal barrier, and casing/explosive interface temperature of a wood-pallet mounted bomb for a range of fire sizes. The model predictions compare favorably with measured results from a limited number of experiments. Further experimental data are needed to refine the model and establish an acceptable confidence level in the predicted values. The proposed work necessary to provide this refinement and verification is described.

PB81-154551 PC **A10**/MF **A01**
General Motors Technical Center, Warren, MI. GM Transportation Systems Div.
Systems Operation Studies for Automated Guideway Transit Systems: Representative Application Areas for AGT.
Final rept. Nov 78-May 80,
R. Cowan, L. Bonderson, and F. Alberts. Nov 80, 223p DOT-TSC-UMTA-80-30, UMTA-MA-06-0048-80-7
Contract DOT-TSC-1220
See also PB80-226509.

The purpose of the Application Area Definition task is to define the travel demands and guideway networks for a set of representative AGT system deployments. These demands and networks, when combined with detailed descriptions of the systems and their operating characteristics, define the representative systems to be modeled and analyzed in other tasks within the SOS program. Results of the definition of representative AGT system deployments for analysis in the AGT-SOS program are presented in this report. Each deployment consists of a demand type, an AGT system, and a guideway network type. Seven demand types, including three metropolitan areas, two central business districts, and two activity centers are defined, and a representative locale of each type is chosen. Station-to-station demands generated after the process for generating zone-to-zone demands for the metropolitan area applications are also presented. The following seven guideway network types are defined: shuttle, loop, one-way loop, two-way loop, multiple loop, partially connected grid, and fully connected grid. Ten AGT systems have been defined in another phase of the AGT-SOS program. From among the possible combinations of demands, systems, and networks, 19 representative deployments are selected, and a network is presented for each. The results of network flow analyses, in which the compatibility between the network and the station-to-station demand is evaluated, are presented for the representative SLT deployments.

PB81-154569 PC **A07**/MF **A01**
Washington Univ., Seattle. Urban Transportation Program.
Planning and Designing a Transit Center Based Transit System: Guidelines and Examples from Case Studies in Twenty-Two Cities,
Jerry B. Schneider, Stephen P. Smith, Paul D. Thompson, James L. Heid, and Irene W. Ng. Sep 80, 133p UMTA-WA-11-0007-81-1

The purpose of this report is to examine the transit center concept to determine if and how it might be applied in American cities to provide more efficient and effective transit service on an areawide basis. Transit centers are interchange facilities that will be typically located in suburban areas at or near major activity centers and will serve as focal points for high levels of local, radial, and circumferential transit service. Bus/bus, bus/rail, and auto/rail transfers will occur there. In this report, present metropolitan travel patterns in American cities are examined. The inability of highly downtown-focused transit networks to meet metropolitan travel needs in American cities is discussed. In addition, the grid network approach to route planning is critiqued. A planning framework, consisting of 10 steps and designed to aid planners design transit centers, is presented. Each step of the process is illustrated with examples from 22 case studies which include four Canadian, one Indian, and one West German city. Abstracts of the case studies are included in Appendix A of this report. Regional shopping centers are suggested to be ideal sites for transit center locations. The transit center oriented network is assessed critically from an operational, financial, and political perspective. Sixty-two examples of areawide plans, location and design criteria, the physical design of downtown, freeway and suburban off-street transit centers and cost estimates are presented.

PB81-154858 PC **A08**/MF **A01**
Boeing Aerospace Co., Seattle, WA. Automated Transportation Systems.
Morgantown People Mover Collision Avoidance System Design Summary.
Final rept.,
Robert J. Schroder, and Roy S. Washington. Sep 80, 167p DOT-TSC-UMTA-80-37, UMTA-MA-06-0048-80-9

The Morgantown People Mover (MPM) is an automated two-mode (schedule and demand) transit system that consists of a fleet of electrically powered, rubber-tired, passenger-carrying vehicles operating on a dedicated guideway under computer control. The present operational MPM system consists of 5 stations, a vehicle maintenance facility with a small test loop, a central control facility, 73 electrically powered, rubber-tired vehicles. This report describes the Collision Avoidance System (CAS) design used for the current (1980 Phase II) MPM system. It presents historical data leading to the current design. The report also includes results of experience with the CAS, plans for system improvements, and recommendations for future designers of such systems. Identification of safety and operability requirements led to a unique implementation of a proven safety concept--block occupancy control. Problems encountered and the design solutions which evolved are discussed with emphasis upon fail-safe features. The resulting CAS design is assessed and found to be extremely safe. Possible improvements and extensions are discussed. Shorter headway and bi-directional operations are found to be feasible. This report contains a glossary of terms and many charts illustrating the elements of the MPM system.

PB81-155186 PC **A03**/MF **A01**
Connecticut Univ., Storrs. Dept. of Civil Engineering.
Development and Experimental Evaluation of a Steel Pipe Vehicle Impact Attenuation System. Report on Model Tests Conducted at the University of Cambridge, England.
Progress rept. May-Jun 80,
John F. Carney, III. Jul 80, 37p CE-80-136, FHWA-CT-RD-722-1-80-13

This report documents the quasi-static and dynamic (impact) model testing program conducted by the Principal Investigator from 5/19/80 to 6/27/80 at the University of Cambridge in England. The tests were carried out at Cambridge to take advantage of their impact loading laboratory facilities which were made available to the Principal Investigator at no charge to the project. Over forty individual tests were run during the six week period. The tests ranged from the quasi-static loading of single steel tubes to the impact loading of complete systems. All tests were conducted with mild steel seamless tubing (Specification B.S. 980 1950 CDS 2). The experiments demonstrate the feasibility of conducting full-scale crash tests on clusters of steel tubes as stationary impact attenuating devices.

PB81-158180 PC **A11**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Center for Transportation Studies.
Technical Change in the Railroad Industry. Part I: Piggybacking and Intermodalism.
Final rept.,
Ann F. Friedlaender. Oct 80, 249p NSF/RA-7617394/1
Grant NSF-PRA76-17394
See also Part 2, PB81-158198.

This report consists of five papers involving technical change in the railroad industry. The papers are concerned mainly with piggybacking and intermodalism, terms used for rail truck movements in which entire truck trailers or truck containers are loaded onto railroad flat cars. Included are the following papers: (1) 'The Structure of Technology and Costs of U.S. and Canadian Railroads' examines the question of whether regulation inhibits technological changes in the railroad industry; (2) 'Intermodalism and Integrated Transportation Companies in the U.S. and Canada' explores whether intermodal ownership has encouraged the use of intermodal operations in Canada as opposed to the U.S.; (3) 'Rate Freedom and Intermodal Usage' compares the pricing structures of intermodal services in Canada and the U.S.; (4) 'Piggyback Plans: Costs, Rates, and Profitability' analyzes the profitability of piggyback operations, including peculiarities of such operations; and (5) 'Some Observation on Domestic Freight Forwarding in Canada and the U.S., An Hitherto Neglected Component of the Transportation Universe' examines the status of domestic freight forwarding operations in Canada and the U.S. and focuses on similarities and differences.

PB81-158198 PC **A10**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Center for Transportation Studies.
Technical Change in the Railroad Industry. Part II: Unit Trains.
Final rept.,
Ann F. Friedlaender. Oct 80, 203p NSR/PRA-7617394/2
Grant NSF-PRA76-17394
See also Executive Summary, PB81-138463 and Part 1, PB81-158180.

This report consists of four papers involving technical change in the railroad industry, particularly in the use of unit coal trains. Included are the following: (1) 'Coal Markets and Rail Utilization in Canada since the National Transportation Act' discusses the export metallurgical coal market, the domestic coking industry, and the thermal coal market; (2) 'The Railroad Rate Structure and Service Innovation in the Transportation of Coal' searches for evidence of some causal relationship between rate regulation and service innovation in railroad coal traffic; (3) 'The Rate Structure of Unit Coal Trains in the 1970's' suggests that the railroads have not been entirely successful in exploiting their latent monopoly power with respect to Western coal markets and derives a rate model under monopoly conditions; (4) 'Railroad Volume Coal Rates, A Review of Litigation Accompanying an Innovative Marketing Strategy' evaluates an hypothesis that a regulated firm, in seeking innovations, is constrained through the regulatory process from maximizing the benefits it might receive from a freer market environment.

PB81-158693 PC **A05**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
Interaction and Load Transfer Through Track Guideway Systems. Final Report.
Annual rept. Jan 78-Jan 79,
C. S. Desai, T. Kuppusamy, H. J. Siriwardane, and S. Sture. Jul 80, 91p DOT/RSPA/DPB-50/80/13
Contract DOT-OS-80013

This report describes investigations toward analysis of load transfer and interaction in multicomponent track support systems such as railroad beds. A comprehensive review of the available and relevant literature is followed by delineation of the need for improvements and generalization of the previous analytical and numerical models for track beds. A new finite element approach, called Resistance-Response (RR) method is proposed; it can account for factors such as three-dimensional geometry, nonlinear behavior and interaction effects between various track components. Attention is given to the constitutive behavior of 'solid' as well as 'interface' media. A new dynamic multi degree-of-freedom shear device is developed in order to obtain behavior of interfaces subjected to repetitive loads in various modes of deformation. Proposed work for the next year's research is described, and the potential of application of the research results for analysis and design and improvements in track structures is indicated.

PB81-165060 PC **A06**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
User Guide to TRANSYT Version 8,
R. A. Vincent, A. I. Mitchell, and D. I. Robertson. c1980, 102p TRRL-LR-888
Also pub. as ISSN-0305-1293.

TRANSYT is a method of finding, and studying, the 'best' fixed time plans with which to coordinate the traffic signals in any network of roads for which the average traffic flows are known. This report summarizes the principles of the TRANSYT traffic model and of the signal optimizer, and gives details of the data input and output formats for version 8 of the computer program which implements the method. A worked example is included. The TRRL program TRANSYT/8 includes several improvements compared with versions issued earlier: a preliminary output is provided to aid the selection of cycle time and single/double cycle decisions; a priority control model allows give-way junctions and opposed right-turning traffic streams to be modelled; an option is provided to reduce the likelihood of excessive queues occurring on selected sections of road; the output is substantially modified to include the monetary costs of delay and stops and to give estimates of fuel consumption. The program is written in Fortran IV and can be obtained under license from TRRL. (Copyright (c) Crown Copyright 1980.)

PB81-174112 PC **A12**/MF **A01**
Radian Corp., Austin, TX.
A Survey of Operating Inspection/Maintenance Programs.
Final rept.,
R. F. Klausmeier, and D. K. Kirk. 17 Apr 80, 257p EPA-460/3-80-018A
Contract EPA-68-02-2538

The U.S. Environmental Protection Agency has estimated that 28 states and the District of Columbia will need to implement vehicle Inspection/Maintenance (I/M) programs in order to comply with the Clean Air Act Amendments of 1977. In addition, several areas already have I/M programs. Each I/M program is unique. Its design is strongly influenced by the local economic and political factors and less so by the technical factors. However, in planning for an I/M program, there are basic issues that need to be addressed. The main intent of this study is to provide state agency administrators and technical personnel with information which will aid them in the implementation of an inspection/maintenance program. The report is divided into two sections: The first is a narrative discussion of the results of the survey. Section two contains tables that summarize the different aspects of an inspection/maintenance program.

13G. Hydraulic and Pneumatic Equipment

PB81-159329 (Order as PB81-159196, PC **A07**/MF **A01**)
Shanghai Inst. of Mechanical Engineering (China).
Variational Principles and Generalized Variational Principles for the Hybrid Aerodynamic Problem of Airfoil Cascades on an Arbitrary Stream Sheet of Revolution,
Liu Gaolian 15 Dec 79, 9p
Included in Scientia Sinica, v23 n10 p1339-1347 Oct 80.

In this paper a hybrid aerodynamic problem of airfoil cascades is suggested and formulated first, being a unification as well as a generalization of the conventional direct and inverse problems, so as to meet various requirements of turbomachinery blade design. A new universal function -- moment function -- is also introduced. Then, two families of variational principles and generalized variational principles are established for the hybrid problem of type A, in which along some part of the airfoil contour velocity distribution is prescribed, while along remainder part contour geometry is given. In order to facilitate the treatment of a variety of boundary conditions all of them have been converted into natural ones, and use is made of the artificial interfaces. This paper is primarily aimed as providing a broader and rigorous theoretical basis for introducing the finite element method and other variational methods into computational aerodynamics of turbomachinery.

13H. Industrial Processes

AD-A094 695/4 PC **A04**/MF **A01**
AiResearch Mfg. Co. of Arizona, Phoenix.

Manufacturing Techniques for Producing High Quality Fluidic Laminates at Low Cost.
Final rept. Jun 78-Aug 80,
James S. Roundy. 2 Sep 80, 64p Rept no. 41-2697A
Contract N00019-78-C-0365

This report presents the results of a program conducted by AiResearch for the Naval Air Systems Command and monitored by Harry Diamond Laboratories. The precision stamping and fine blanking manufacturing processes were investigated as a means of producing high quality, low cost fluidic laminates. (Author)

AD-A094 744/0 PC **A04**/MF **A01**
Army Armament Research and Development Command, Watervliet, NY. Large Caliber Weapon Systems Lab.
Mechanical Properties of Rotary Forged Solid ESR Preforms.
Memorandum rept.,
F. A. Heiser. Oct 80, 54p ARLCB-MR-80039, AD-E440 105

Electro Slag Refined steel which had been rotary forged from a solid 20 inch cast ingot into a solid 13 inch diameter cylinder was evaluated metallographically and mechanically. It is shown that the degree of working is not uniform across the cross section, being greatest near the ID and least near the center. This degree of working manifests itself in the ductility but not in the strength or impact toughness. Normalizing, prior to quench and temper, lowered the yield strength slightly, but markedly improved both the toughness and ductility.

AD-A094 987/5 PC **A02**/MF **A01**
Aeronautical Research Labs., Melbourne (Australia).
Nitriding of Chromium in Nitrogen Gas at High Temperature.
Materials note,
T. Mills. Oct 79, 19p Rept no. ARL/MAT/NOTE-128

Parabolic rate constants of the reaction of chromium with nitrogen gas under oxygen-free conditions have been determined over a range of temperature (1000-1250 C) and nitrogen pressure (0.265-101.33 kPa). The growth rate of the subnitride was measured by a thermogravimetric technique using a single specimen. Wagner's oxidation theory is used to calculate the self-diffusivity and intrinsic diffusivity of nitrogen in the subnitride from a theoretical analysis of the parabolic rate constant. The calculated diffusivities varied with the composition of the subnitride, having minimum values at intermediate compositions of the non-stoichiometric chromium nitride Cr2N.

PB81-153918 PC **A06**/MF **A01**
Mercer County Energy Development Board, Hazen, ND.
Economic Feasibility of Using Fly Ash in the Ceramic and Concrete/Cement Industries, Mercer County, North Dakota.
Jun 80, 119p EDA-81-019
Grant EDA-05-06-01878

The Energy Development Board of Mercer County (EDB) has prepared an economic diversification plan to guide Mercer County's efforts to prevent negative effects from the rapid growth it is experiencing. This economic diversification plan seeks not only to provide the means to diversify the local employment base, but also to take advantage of ongoing energy development. The plan has three general objectives: economic development, energy resource conservation, and resource recovery. As a first step in carrying out the economic diversification plan, EDB staff conducted a preliminary screening of potential new industries for Mercer County. Fly-ash based products proved to be the industry that currently best fulfilled all three general objectives of the economic diversification plan. It could provide a new source of employment, conserve energy resources, and provide a means to use a product that is currently discarded.

13I. Machinery and Tools

AD-A095 008/9 PC **A03**/MF **A01**
Southwest Research Inst., San Antonio, TX. Army Fuels and Lubricants Research Lab.
High-Hot-Hardness Gear/Lubricant Evaluations.
Interim rept. Jan 78-Sep 80,
B. B. Baber. Nov 80, 27p Rept no. AFLRL-132
Contracts DAAK70-78-C-0001, DAAK70-80-C-0001

A WADD gear machine was used to evaluate the gear load-carrying capacities of three high-hot-hardness gear materials, Cartech EX 00014, CBS 1000 M, and Vasco X-2 ESR, at 74 C and 218 C (165 F and 425 F). One MIL-L-23699C lubricant was used to evaluate all three gear materials at the two test temperature levels. Three additional military specification type turbine engine lubricants were included in the evaluation of the Vasco X-2 ESR gear material. An increase in gear load-carrying capacity, ranging from 10 to 35 percent, was obtained for the three high-hot-hardness gear materials when compared with equivalent 74 C (165 F) data using AMS 6260 steel gears. A candidate MIL-L-27502 lubricant provided the highest load-carrying capacity at 74 C (165 F) test conditions using the Vasco X-2 ESR test gears. It is shown that the load-carrying capacity of gears made from different materials do not necessarily have the same relative ranking when evaluated at two different temperature levels.

N81-16471/7 PC **A05**/MF **A01**
Illinois Univ. at Urbana-Champaign.
Transient Dynamic Analysis of High-Speed Lightly Loaded Cylindrical Roller Bearings. 1: Analysis.
Final Report.
T. F. Conry. Jan 81, 83p NASA-CR-3334
Grant NSG-3098

The governing differential equations of motion for a high speed cylindrical roller bearing are developed under the assumptions that the bearing is isothermal and that the roller tilt and skew are very small. Two sets of differential equations are presented: the first which deals with planar motion of the roller bearing system; and the second which includes the effect of roller skewing. The equations as presented are in a format for programming on a digital computer.

N81-16472/5 PC **A04**/MF **A01**
Illinois Univ. at Urbana-Champaign.
Transient Dynamic Analysis of High-Speed Lightly Loaded Cylindrical Roller Bearings. 2: Computer Program and Results.
Final Report.
T. F. Conry, and P. R. Goglia. Jan 81, 62p
NASA-CR-3335
Grant NSG-3098

The governing differential equations of motion for a high speed cylindrical roller bearing are programmed for numerical solution and plotted output. This computer program has the capability of performing a two dimensional or three dimensional simulation. Two numerical solutions of the governing differential equations were obtained to simulate the motion of a roller bearing, one for the two dimensional equations of motion and one for the three dimensional equations of motion. Computer generated plots were obtained and present such data as roller/cage interaction forces, roller/race traction forces, roller/race relative slip velocities and cage angular speed over a nondimensional time equivalent to 1.2 revolutions of the inner race. Roller axial displacement, roller skew angle, and skew moment are also plotted for the three dimensional solution. The trajectory of the cage center is plotted for both the two dimensional and three dimensional solutions.

N81-16473/3 PC **A06**/MF **A01**
California State Univ., Northridge.
Roller Skewing Measurements in Cylindrical Roller Bearings.
Final Report.
L. J. Nypan. Jan 81, 106p NASA-CR-3381
Grant NSG-3065

Measurements of roller skewing in a 118 mm bore roller bearing operating at shaft speeds to 12,000 rpm are reported. High speed motion pictures of a modified roller were taken through a derotation prism to record skewing as the roller moved through loaded and unloaded regions of the bearing. Subsequent frame by frame measurement of the photographic film provided information on roller skewing. Radial and tangential skew amplitudes of 0.4 to 0.5 degrees were observed with 0.5 degree misalignment.

PAT-APPL-6-106 130 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Sequenced Drive for Rotary Valves.
Patent Application,
L. C. Mittell. Filed 21 Dec 79, 11p
Contract EX-76-C-01-2356
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A sequenced drive for rotary valves which provides the benefits of applying rotary and linear motions to the movable sealing element of the valve is described. The sequenced drive provides a close approximation of linear motion while engaging or disengaging the movable element with the set minimizing wear and damage due to scrubbing action. The rotary motion of the drive swings the movable element out of the flowpath thus eliminating obstruction to flow through the valve. (ERA citation 06:005171)

PAT-APPL-6-106 131 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method and Apparatus for Forming Flues on Tubular Stock.
Patent Application,
D. E. Beck, and C. Carson. Filed 21 Dec 79, 11p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention is directed to a die mechanism utilized for forming flues on long, relatively narrow tubular stock. These flues are formed by displacing a die from within the tubular stock through perforations previously drilled through the tubular stock at selected locations. The drawing of the die upsets the material to form the flue of the desired configuration. The die is provided with a lubricating system which enables the lubricant to be dispensed uniformly about the entire periphery of the die in contact with the material being upset so as to assure the formation of the flues. Further, the lubricant is dispensed from within the die onto the peripheral surface of the latter at pressures in the range of about 2000 to 10,000 psi so as to assure the adequate lubrication of the die during the drawing operation. By injecting the lubricant at such high pressures, low viscosity liquid, such as water and/or alcohol, may be efficiently used as a lubricant and also provides a mechanism by which the lubricant may be evaporated from the surface of the flues at ambient conditions so as to negate the cleansing operations previously required prior to joining the flues to other conduit mechanisms by fusion welding and the like. (ERA citation 06:005170)

PAT-APPL-6-123 861 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Laser Cutting Apparatus for Nuclear Core Fuel Subassembly.
Patent Application,
A. P. Walch, and A. B. Caruolo. Filed 22 Feb 80, 20p
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The object of the invention is to provide a system and apparatus which employs laser cutting to disassemble a nuclear core fuel subassembly. The apparatus includes a gantry frame which straddles the core fuel subassembly, an x-carriage travelling longitudinally above the frame which carries a focus head assembly having a vertically moving carriage and a laterally moving carriage, a system of laser beam transferring and focusing mirrors carried by the x-carriage and focusing head assembly, and a shroud follower and longitudinal follower for following the shape of shroud to maintain a beam focal point fixed upon the shroud surface for accurate cutting. (ERA citation 06:005243)

PATENT-4 202 739 Not available NTIS
Department of Energy, Washington, DC.
Electrochemical Removal of Material from Metallic Work.
Patent,
T. Csakvary, and R. E. Fromson. Filed 25 Apr 77, patented 13 May 80, 8p PAT-APPL-790 226
Supersedes PAT-APPL-790 226-77.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Deburring, polishing, surface forming and the like are carried out by electrochemical machining with conformable electrode means including an electrically conducting and an insulating web. The surface of the work to be processed is covered by a deformable electrically insulating web or cloth which is perforated and conforms with the work. The web is covered by a deformable perforated electrically conducting screen electrode which also conforms with, and is insulated from, the work by the insulating web. An electrolyte is conducted through the electrode and insulating web and along the work through a perforated elastic member which engages the electrode under pressure pressing the electrode and web against the work. High current under low voltage is conducted between the electrode and work through the insulator, removing material from the work. Under the pressure of the elastic member, the electrode and insulator continue to conform with the work and the spacing betwen the electrode and work is maintained constant. (ERA citation 06:004022)

PB81-153173 PC **A04**/MF **A01**
National Knitwear and Sportswear Association, New York.
Study to Improve the Efficiency of Post-Knitting Operations in Knitted Outerwear Mills.
Final rept.
Jan 81, 60p EDA-81-015
Prepared by Weintraub (Emanual) Associates, Inc., New York.

The purpose of this research project was to conduct a comprehensive study of equipment and methods being used in applicable branches of the apparel manufacturing industry that can be applied to post knitting operations of knitwear manufacturers to reduce costs and labor intensity. The findings of this report indicate that reductions in cost and labor intensity are available. Some of the companies that were visited have incorporated new equipment and were able to provide production savings in terms of the number of units produced or the number of employees transferred to other jobs.

PB81-154353 PC **A04**/MF **A01**
ACTION/Peace Corps, Washington, DC.
How to Make Tools.
Information collection and exchange reprint series,
Per Christiansen, and Bernard Zubrowski. Jul 80, 58p REPRINT R-35

Fabrication of simple hand tools from available materials is described.

PB81-858128 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Plasma Etching Technology and Applications. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 67p NERACSPNNT2959

This retrospective bibliography contains citations concerning plasma etching technology, techniques, and applications to various materials and surfaces. Topics include end-point detection, plasma mechanisms, magnetic field control of reactive plasma, and flow-rate dependencies and effects. (Contains 60 citations, fully indexed and including a table of contents.)

PB81-858631 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Welding Machines. January, 1972-January, 1981 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Jan 81.
Jan 81, 152p NERACIAANT2611

This bibliography covers information concerning welding machines and accessories. Topics include automatic and, computer controlled, and robot aided welding machines. (Contains 159 citations, fully indexed and including a table of contents.)

PB81-860025 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Woodworking Machinery: Applications and Safety. January, 1970-January, 1981 (Citations from the Engineering Index Data Base).
Rept. for Jan 70-Jan 81.
Jan 81, 57p NERACEI NT2613

This bibliography covers information on woodworking machinery for wood and wood products. Topics include cost reduction, production improvements, and safety standards. (Contains 60 citations, fully indexed and including a table of contents.)

13J. Marine Engineering

AD-A094 624/4 Not available NTIS
National Academy of Sciences, Washington, DC.
Naval Hydrodynamics Symposium (12th) on Boundary Layer Stability and Transition Ship Boundary Layers and Propeller Hull Interaction Cavitation Geophysical Fluid Dynamics.
1979, 642p
Availability: National Academy of Sciences, Attn: Office of Publications. 2101 Constitution Ave., N.W., Washington, DC, Library of Congress Catalog Card No. 79-53803. HC$18.75 (No copies furnished by DTIC).

The Twelfth Symposium on Naval Hydrodynamics was held at Washington, D.C., during the period 5-9 June 1978 under the joint sponsorship of the Office of Naval Research, the David W. Taylor Naval Ship Research and Development Center, and the National Academy of Sciences. The technical program of the Symposium consisted of eight sessions equally apportioned among the following four subjects of great current interest in the general field of naval hydrodynamics: (1) boundary layer stability and transition, (2) ship boundary layers and propeller hull interaction, (3) cavitation, and (4) geophysical fluid dynamics. Tours of the hydrodynamic research facilities of the David W. Taylor Naval Ship Research and Development Center and of Hydrodynamics, Inc., were also included in the technical program. (Author)

AD-A094 689/7 PC **A05**/MF **A01**
Systems Control, Inc., (VT), Palo Alto, CA.
Planning System Identification Trials of Waterway Tows.
Engineering technical rept. 22 Jul 79-22 Jul 80,
Thomas L. Trankle. Dec 80, 90p SCI-5327-01, ONR-CR-215-276-1F
Contract N00014-79-C-0786

This report presents a plan for determining hydrodynamic coefficients of maneuvering simulation models for river tow/barge flotillas from data collected during free-running maneuvering trials of the full-scale river tows themselves. The plan includes specification of motion sensor type and accuracy requirements and a schedule of maneuvers to be executed during trials. Simulation of the maneuvering trials and data collection indicates that the system identification statistical data processing technique can estimate hydrodynamic coefficients similar in form to those obtained from towing tank planar motion mechanism tests. Calculation of the sensitivity of definitive maneuvering characteristics to changes in hydrodynamic coefficients indicates coefficient estimation accuracy requirements. (Author)

AD-A094 690/5 PC **A03**/MF **A01**
David W. Taylor Naval Ship Research and Development Center, Bethesda, MD. Ship Performance Dept.
Investigations of Underwater Flow Patterns for Three Tunnel-Fin Configurations for the Naval Auxiliary Oiler (AO 177) Represented by Model 5326-1.
Final rept.,
Gary A. Hampton. Feb 81, 34p Rept no. DTNSRDC/SPD-0544-17

An experimental program was conducted at the David W. Taylor Naval Ship R&D Center (DTNSRDC) to aid in the identification and resolution of the hull vibration problem experienced by the Auxiliary Oiler AO 177 and to validate possible remedies. The formulated program included evaluations with three tunnel-fin configurations fitted to the stern of the model. The experiments involved visual flow observations, propulsion experiments and wake surveys experiments. This report deals exclusively with the observations of the flow variations for three different tunnel-fin configurations. The propulsion experiments and wake survey experiments will be published in separate reports. An improved flow pattern was observed with the tunnel-fin designed as configuration number one. (Author)

AD-A094 692/1 PC **A04**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
A New Slender-Ship Theory of Wave Resistance.
Technical rept.,
Francis Noblesse. Jan 81, 59p Rept no. 81-1
Contract N00014-78-C-0169
See also AD-A059 958, AD-A061 933 and AD-A069 811.

A new slender-ship theory of wave resistance is presented. Specifically, a sequence of explicit slender-ship wave-resistance approximations is obtained. These approximations are associated with successive approximations in a slender-ship iterative procedure for solving a new (nonlinear integrodifferential) equation for the velocity potential of the flow caused by the ship. The zeroth-, first, and second-order approximations are given explicitly and examined in some detail.

AD-A094 725/9 PC **A04**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.
Remote Unmanned Work System Vehicle Tether Cable Termination and Potting Procedures.
Final rept. 1978-1980,
Robert S. Stark. Dec 80, 55p Rept no. NOSC/TD-394
See also Rept. no. NUC-TN-1681.

The procedures for potting and terminating the strength and electrical portions of the tether cable of the Remote Unmanned Work System (RUWS) are described. Also included are lists of tools and materials to be used in the process. (Author)

AD-A094 740/8 PC **A03**/MF **A01**
Chi Associates., Inc., Arlington, VA.
Powering Predictions for the R/V ATHENA (PG 94) Represented by Model 4950-1 with Design Propellers 4710 and 4711.
Final rept.,
L. Bruce Crook. Jan 81, 38p DTNSRDC/SPD-0833-05
Contract N00167-78-C-0089

As part of its overall project to adapt controllable pitch propellers to the needs of high speed combatant ships, the David W. Taylor Naval Ship Research and Development Center (DTNSRDC) conducted a series of resistance and propulsion experiments on a model of the R/V ATHENA. These experiments were conducted to provide estimates of power requirements with design propellers for blade loading calculations. This report provides experimental conditions for setting up the blade loading model experiments. The estimated correlation allowance between full-scale data and model data with design propellers was found to be 0.00065. (Author)

AD-A094 794/5 PC **A04**/MF **A01**
Stevens Inst. of Tech., Hoboken, NJ. Davidson Lab.
A Theoretical Procedure for Calculating Propeller-Induced Hull Forces.
Final rept.,

S. Tsakonas, and Daniel T. Valentine. Sep 80, 56p Rept no. SIT-DL-79-9-1979
Contract N00014-76-C-0862

A method based on rational mechanics is presented for predicting hydrodynamic forces and moments on a hull of arbitrary geometry as a reaction to the propeller-induced velocity field. This method assumes that the hull surface can be represented by a distribution of sources. The numerical procedure is adapted to the CDC 7600 or Cyber 176 digital computer which furnishes the strength of the source distribution over the hull and the vertical component of the propeller-induced hull force at blade frequency. The program is executed for two widely different cases for which experimental measurements are available: a spheroidal head in the presence of a 3-bladed propeller operating in uniform inflow, and a Series 60 hull model (V-form stern) driven by a 4-bladed propeller. Theoretical predictions show agreement with corresponding experimental measurements within 11% for the body of revolution and 27% for the surface ship. A new method has lately been devised which replaces the sources by a distribution of doublets, thus replacing the three components of normal velocity by the negative of the velocity potential which has no directivity. Preliminary results show a substantial reduction in computing time and improvement in the accuracy of the results as well. The calculated theoretical predictions for the quadrilateral distribution now show an agreement with the measurements within 2% for the body of revolution and 10% for the surface ship.

AD-A095 029/5 PC **A05**/MF **A01**
Naval Postgraduate School, Monterey, CA.
Ship Roll Control by Pump Activated Tanks.
Master's thesis,
James Curtis Devin. Sep 80, 83p

Frequency domain methods are employed for the design and analysis of antiroll tank systems. A waveslope spectrum of the ocean is developed based upon the trochoidal model of ocean waves and the Pierson-Moskowitz ocean wave power spectra. The response of a typical ship to the waveslope spectrum is studied with the aid of a numerical example. FORTRAN subroutines for the design of passive and pump-activated U-tube antiroll tanks are developed, and the effects of a tank installation on the ship parameters is observed. Many controller design methods are investigated, and final design is accomplished by exhaustive research of closed-loop frequency responses. Frequency responses of passive and activated tank stabilized ships are compared with that of an unmodified ship to illustrate the effectiveness of design. The effects of vessel displacement variations due to consumption of fuel and stores on tank effectiveness and controller design are discussed. (Author)

AD-A095 044/4 MF **A01**
Pennsylvania State Univ., State College. Applied Research Lab.
Quality Control Considerations for Fabrication of Model Propellers Intended for Cavitation Testing.
Technical memo.,
B. R. Parkin. 20 Aug 80, 77p Rept no. ARL/PSU/TM-80-172
Contract N00024-79-C-6043
Availability: Microfiche copies only.

A study of blade-surface asperities with respect to their effect on cavitation onset on marine propellers is carried out to investigate possible quality control criteria for propeller models intended for cavitation inception tests. The OBO propeller is used as an example to test possible calculation procedures. The asperities consisted of two-dimensional isolated triangular roughness elements, distributed roughness and large scale two-dimensional blade-surface bumps or waves. It was found that useful quality control criteria cannot be formulated for triangular roughness elements because the basic data which would permit their development are not available. However, it does appear feasible to develop quality control criteria for the other two types of blade asperities and computation procedures which can lead to the formulation of blade-surface fabrication specifications are given for them. (Author)

AD-A095 061/8 PC **A02**/MF **A01**
Teesside Polytechnic, Middlesbrough (England). Dept. of Mechanical Engineering.
Roughness Characteristics of Plane Surfaces Based on Velocity Similarity Laws.
Conference proceedings,
M. J. Kings, K. B. Chuah, S. T. Olszowski, and T. R. Thomas. Jan 81, 11p
Grant N00014-78-G-0059

Some common problems of surface measurement and ambiguities of description are discussed and it is shown that numerical discrepancies of a factor of 20 can result from the latter. A comprehensive programme of roughness measurement on working surfaces is described associated with a programme of flow measurement in an open flume in an attempt to isolate a range of surface wavelengths responsible for drag. A feasibility study of roughness measurement on coated surfaces is followed by measurements on hull replicas, gravel and coated steel plates. Measurements of an ablative coating system before and after an ocean voyage demonstrates a loss of roughness associated with a smoothing of peaks. Flow measurements suggest that surface wavelengths of less than 100 microns do not interact with the fluid. (Author)

AD-A095 065/9 PC **A04**/MF **A01**
Stevens Inst. of Tech., Hoboken, NJ. Davidson Lab.
Effect of Low Freeboard on the Behavior of an Amphibious Vehicle in Head Seas.
Final rept.,
E. Numata, and M. J. Chiocco. Jan 81, 72p Rept no. SIT-DL-81-9-2155
Contract N00014-80-D-0890

The relatively low freeboard resulting from the low silhouette of the new generation of amphibious craft has raised questions relating to their waterborne performance. Existing configurations having greater freeboard have been speed-limited in smooth water when negative trim has caused bow swamping and loss of visibility. With decreased freeboard the attainable speed of the proposed vehicles may be reduced to an unacceptable level in smooth water and waves. A model test program was initiated to study the behavior of a representative amphibious craft in an operational sea state. The following parameters were systematically varied to evaluate their effect on mean running freeboard, vertical acceleration and mean resistance as a function of vehicle speed in the head sea state 2: vehicle gross weight, vehicle LCG location, height over troop compartment, and deflection angle of water jet propulsor thrust. The general objective was to define the operating boundaries of the vehicle.

DOE/NOAA/OTEC-30(V.3) PC **A09**/MF **A01**
Rosenblatt (M.) and Son, Inc., New York.
Preliminary Designs for Modular OTEC Platform Station-Keeping Subsystems. Final Report. MR And S Report No. 6042-6.
29 Feb 80, 176p
Contract EG-77-A-29-1078

This volume of the report presents the results of the third through the sixth tasks of the Station Keeping Subsystem (SKSS) design studies for 10/40 MW/sub e/ capacity OTEC Modular Experiment platforms (MEP). Tasks 3 through 6 are: (3) complete preliminary designs for one SKSS for each of the two platforms (SPAR and BARGE); (4) development and testing recommendations for the MEP SKSS; (5) cost-time analysis; and (6) commercial plant recommendations. The overall conclusions and recommendations for the modular, as well as the commercial, OTEC platform station keeping subsystems are delineated. The basic design assumptions made during the process, the technical approach followed, and the results of design iterations, reliability and performance analyses are given. A complete description of the preliminary design SKSS concept is presented. The summary cost estimates for each of the alternative SKSS concepts considered are presented and a time schedule for the recommended concept is provided. The effects of varying some of the important parameters used in SKSS design on the performance and cost of the mooring system are investigated and results presented. The tests required and other developmental recommendations in order to verify and confirm the basic design assumptions are discussed. Finally, the experience gained in the MEP preliminary designs are extended to future commercial OTEC plants' SKSS designs. (ERA citation 05:025653)

PB81-153488 PC **A03**/MF **A01**
Webb Inst. of Naval Architecture, Glen Cove, NY.
Evaluation of Alternative Diesel Containership Propulsion Plants.
Technical rept.,
Gary J. Bahan, and Alan L. Rowen. Sep 80, 46p NMRC-203
Contract MA79-SAC-00068
Prepared in cooperation with the Baham Corp.

This report investigates methods of reducing marine power plant costs and fuel consumption through the use of diesel power plants. In this study, diesel plant concepts were developed for a refrigerated containership application and their economic aspects investigated in comparison with a conventional steam power plant. The methods of analysis are detailed in the report to facilitate their use in other studies.

PB81-153710 PC **A06**/MF **A01**
Sun Ship, Inc., Chester, PA.
Copper-Nickel Hull Sheathing Study.
Phase rept. 1978-80,
Leslie W. Sandor. Dec 80, 101p MA-RD-930-81025
Contract DO-A01-78-3091

Fuel consumption of ships is related to hull roughness. The increasing high cost of fuel is the driving force behind the efforts that are expended in looking for methods, which would reduce hull roughness and would maintain a smooth hull surface profile during the designed life of a ship. One such desirable method involves the use of copper-nickel. This study examined a number of methodologies for applying Cu/Ni in sheet form. The welding of Cu/Ni clad steel was also evaluated in a shipyard environment. The cost differential between Cu/Ni sheathed and conventional painted hulls was determined for a large container ship. The economic analysis was based on 1980 cost figures and a specific application method of Cu/Ni hull sheathing. The results were 33.5% for the effective discounted cash rate of return and 4.2 years for the zero-interest breakeven point--against an initial incremental investment of $3.4 million using 46% tax rate.

PB81-153991 PC **A05**/MF **A01**
Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
On the Theory of Coupled Ship Motions and Vibrations.
Technical rept.,
Hisaaki Maeda. Sep 80, 80p 232, MA-RD-940-80061
Contract MA-7-3806
Sponsored in part by American Bureau of Shipping, New York. Ocean Engineering Div.

A forward speed, short wave, linear ship dynamics theory is developed. Particular attention is paid to vibration response of the ship hull.

PB81-154049 PC **A02**/MF **A01**
Global Marine Development, Inc., Newport Beach, CA.
Floating Vessels for Industrial Plants. Volume I. Executive Summary.
Final rept. Sep 79-Dec 80,
M. Halebsky, J. Herrington, M. Krutein, and E. R. Davis. Jan 81, 17p 04107-001-VOL-1, MA-RD-940-81031
Contract MA79-SAC-00080
See also Volume 2, PB81-154056.

The past history, current status, and future potential and applications for floating industrial vessels were determined. Special emphasis was placed on those concepts with the greatest likelihood for implementation by the year 2000 as well as those which would provide the greatest stimulus to the Maritime Industry. A classification and rating system was developed for the different concepts. Fifty-one existing, floating facilities were identified. The ten concepts considered most likely to be im-

plemented were identified. The study was performed in two phases: Part I (this report) - a worldwide survey of industrial plant vessels, and Part II (a separate report) - a survey of those plant vessels which specifically provide municipal services.

PB81-154056 PC **A07**/MF **A01**
Global Marine Development, Inc., Newport Beach, CA.
Floating Vessels for Industrial Plants. Volume II. Detailed Study.
Final rept. Sep 79-Dec 80,
M. Halebsky, J. Herrington, M. Krutein, and E. R. Davis. Jan 81, 145p 04107-001-VOL-2, MA-RD-940-81032
Contract MA79-SAC-00080
See also Volume 1, PB81-154049.

The past history, current status, and future potential and applications for floating industrial vessels were determined. Special emphasis was placed on those concepts with the greatest likelihood for implementation by the year 2000 as well as those which would provide the greatest stimulus to the Maritime Industry. A classification and rating system was developed for the different concepts. Fifty-one existing, floating facilities were identified. The ten concepts considered most likely to be implemented were identified. The study was performed in two parts: Part I (this two volume report) - a worldwide survey of industrial plant vessels, and Part II (a separate two volume report) - a survey of those plant vessels which specifically provide municipal services.

PB81-155038 PC **A03**/MF **A01**
Webb Inst. of Naval Architecture, Glen Cove, NY.
Marine Diesel Application Impediments - An Assessment of Shipowner Opinion.
Technical rept.,
Alan L. Rowen. Apr 80, 44p NMRC-205
Contract MA-5-0092

This report, based on interviews with representatives of some twenty shipowners and operators, identifies and analyzes problem areas in the wider application of diesel propulsion for U.S. flag ocean going cargo vessels. Factors discussed with the shipowners relate to shipyards, engine builders, cost assessment, fuel quality, power requirements, maintenance practices, reliability, automation, noise and vibration, auxiliary machinery and personnel. The report is intended as the first phase of a larger study.

13K. Pumps, Filters, Pipes, Fittings, Tubing and Valves

AD-A094 680/6 PC **A07**/MF **A01**
Oklahoma State Univ., Stillwater. Fluid Power Research Center.
MERADCOM/OSU Assessment and Rating of the Contaminant Sensitivity of Relief Valves.
Final rept. Oct 79-Oct 80,
James R. Gillum. Oct 80, 145p Rept no. OSU-FPRC-M111980
Contract DAAK70-79-C-0154

The purpose of this research effort is to develop a new test and evaluation method for the contaminant sensitivity of fluid power pressure relief valves. This report contains the background research, test development, and test verification results which were conducted during the contract period. Also included is the proposed SAE standard procedure for relief valve contaminant sensitivity verification which has been developed. Finally, a new rating method for the contaminant sensitivity of relief valves is presented. (Author)

PATENT-4 195 664
Not available NTIS
Department of Energy, Washington, DC.
Surge-Damping Vacuum Valve.
Patent,
J. C. Bullock, and B. E. Kelly. Filed 25 Jan 78, patented 1 Apr 80, 4p PAT-APPL-872 285
Supersedes PAT-APPL-872 285-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A valve having a mechanism for damping out flow surges in a vacuum system is described which utilizes a slotted spring-loaded disk positioned adjacent the valve's vacuum port. Under flow surge conditions, the differential pressure forces the disk into sealing engagement with the vacuum port, thereby restricting the flow path to the slots in the disk damping out the flow surge. (ERA citation 06:004058)

PATENT-4 204 558
Not available NTIS
Department of Energy, Washington, DC.
Valve Assembly Having Remotely Replaceable Bearings.
Patent,
E. R. Johnson, and D. E. Tanner. Filed 16 Jan 78, patented 27 May 80, 10p PAT-APPL-869 702
Supersedes PAT-APPL-869 702-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A valve assembly having remotely replaceable bearings is disclosed wherein a valve disc is supported within a flow duct for rotation about a pair of axially aligned bearings, one of which is carried by a spindle received within a diametral bore in the valve disc, and the other of which is carried by a bearing support block releasably mounted on the duct circumferentially of an annular collar on the valve disc coaxial with its diametrical bore. The spindle and bearing support block are adapted for remote removal to facilitate servicing or replacement of the valve disc support bearings. (ERA citation 06:004021)

PB81-165029 PC **A03**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Behaviour of a Shallow Buried Pipeline under Static and Rolling Wheel Loads,
R. G. Pocock, G. J. L. Lawrence, and M. E. Taylor. c1980, 28p TRRL-LR-954
Also pub. as ISSN-0305-1293.

The bending strains developed in an experimental shallow buried pipeline due to static and rolling wheel loads have been investigated. The instrumented pipeline, comprising eight 3.7 m lengths of 100 mm internal diameter spun iron pipe with lead-run joints, was constructed under a weak pavement. Both good and poor bedding conditions were established. Commercial vehicles having axle loads up to 10 Mg were used to traffic the buried pipeline at speeds of up to 48 km/h. The measured bending strains increased linearly with axle load, the strains for any given load tending to decrease with increasing vehicle speed. Axle spacing had little effect on maximum strains in the pipeline for the range of vehicles used. Residual strains developed during backfilling and pavement construction did not vary appreciably throughout the test program, involving some 300 axles of loading. Maximum strains were always associated with the poorly bedded pipes and under the most severe loading applied, were similar in magnitude to the maximum residual strain and small in relation to the failure strain derived from tests on sample pipes. (Copyright (c) Crown Copyright 1980.)

PB81-859274 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Vacuum Pumps. January, 1970-January, 1981 (Citations from the NTIS Data Base).
Rept. for Jan 70-Jan 81.
Jan 81, 125p NERACUSGNT2602

This bibliography covers information on design, construction, and applications of vacuum pumps in industrial, commercial, and space technology. Topics include energy conservation, ultra-high vacuum pumps, and turbomolecular pumps. (Contains 119 citations, fully indexed and including a table of contents.)

PB81-859290 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Vacuum Pumps. January, 1970-January, 1981 (Citations from the Engineering Index Data Base).
Rept. for Jan 70-Jan 81.
Jan 81, 177p NERACEI NT2602

This bibliography covers information on design, construction, and applications of vacuum pumps in industrial, commercial and space technology. Topics include energy conservation, ultra-high vacuum pumps and turbomolecular pumps. (Contains 200 citations, fully indexed and including a table of contents.)

STU-76-6032 PC **A03**/MF **A01**
Styrelsen foer Teknisk Utveckling, Stockholm (Sweden).
Long Time Tests of a New PEX Tube for Hot Water Transport.
R. Roseen, and M. Ifwarsson. Dec 79, 50p
STUDSVIK/E-1-79/161
In Swedish.
U.S. Sales Only.

Plastic pipes for hot water transport made of PEX-cross linked polyethene - have been tested for long periods with 80, 95, and 110 Celsius water under pressure. (ERA citation 06:005029)

13L. Safety Engineering

AD-A094 631/9 PC **A04**/MF **A01**
Naval Sea Systems Command, Washington, DC.
Military Specifications, Standards and Contract Clauses Specifying Controls for Protection Against Electrostatic Discharge.
Dec 78, 59p Rept no. NAVSEA-S6000-AB-GTP-010

This document contains excerpts from military standards, specifications and standard contract clauses normally imposed upon equipment contractors and suppliers which generally or specifically require the establishment and implementation of controls for the protection of electronic devices from Electrostatic Discharge (ESD). The standards, specifications and contract clauses listed herein are but a sample of those commonly imposed on equipment suppliers by NAVSEA contracts and is in no way an exhaustive compilation of all contract specifications and clauses requiring ESD controls.

AD-A095 040/2 PC **A08**/MF **A01**
Ammann and Whitney, New York.
Engineering Guide for Fire Protection and Detection Systems at Army Ammunition Plants. Volume 1. Selection and Design.
Louis Joblove, Manuel Avelar, Norval Dobbs, and Leonard Frank. Dec 80, 152p ARLCD-CR-80049, AD-E400 531
Contract DAAK10-78-D-0007

This report presents guidelines for the design of fire protection systems for use in Army Ammunition Plants. Reference is made to existing published standards for fire protection systems and applications of standard and specialized systems. Also presented are approaches to estimating fire protection systems cost.

AD-A095 102/0 PC **A06**/MF **A01**
Naval War Coll., Newport, RI. Center for Advanced Research.
CG Vessel Traffic Service Program.
Final rept.,
Paul T. Potter. Jun 80, 120p

This study examines the U.S. Coast Guard Vessel Traffic Service program with emphasis on the cost-benefit analysis used to justify the installation of the first six systems. The difficulties with Marine casualty data are examined and some proposed changes are outline. The conclusion of the study is that Vessel Traffic systems are a cost-effective means of improving maritime safety within U.S. ports and waterways. (Author)

PB81-152191 PC **A05**/MF **A01**
Science Applications, Inc., Los Angeles, CA.

Measurement of Head Accelerations of Boxers-Feasibility Study.
Final rept. Mar 78-Oct 80,
D. F. Hausknecht, M. Axelrod, and R. Hoard.
May 80, 85p SAI-068-81-513, DOT-HS-805-664
Contract DOT-HS-8-01893

Impacts and closed head injuries resulting from transportation accidents are not well-defined scientifically, because of the scarcity of valid data. Test animals, anthropometric dummies and human cadavers are not sufficient representations to permit correlation of head accelerations with concussive effects. The present effort is a feasibility study of instrumentation boxers during a scheduled bout to obtain the needed data. A miniaturized accelerometer-transmitter would fit unobtrusively in the boxers' mouthpiece and permit blow-by-blow telemetering of head motion data to ringside for later analyses and correlation with observed responses. The feasibility of performing these measurements was examined by conducting a survey of boxing activities (professional and amateur), performing an assessment of the safety and legal requirements, and improving packaging design to enhance boxer comfort and acceptance of a mouthpiece containing the instrumentation. Acceptability tests with a boxer wearing a mouthpiece with a mockup of the instrument and sparring, were conducted. A three-phased plan for conducting the measurements is described and favorable test sites are given.

PB81-154411 PC **A02**/MF **A01**
Public Buildings Service, Washington, DC.
Transformer Room Fire Tests.
Final rept.,
C. D. Fustich. Mar 80, 22p GSA/PBS-79-08

This report covers a series of transformer room fire tests conducted by the General Services Administration (GSA). The tests were set up to demonstrate what shock hazard might be present when automatic sprinklers operated over energized electrical equipment. The test room was 25 feet long, 12 feet wide and 8 feet high. Fire protection was provided by standard one-half inch pendent automatic sprinklers temperature rated at 135 degrees F and installed to give approximately 150 square feet per head coverage. A 480 volt dry transformer was used in the room to provide a 3-phase, 4-wire distribution system, which is typical of the electrical systems found in GSA buildings. The tests showed that the induced currents in the test room during the various tests were relatively small and posed no appreciable personnel shock hazard. Detailed descriptions of the various tests, together with the results and conclusions, are contained in the body of the report.

PB81-155137 PC **A03**/MF **A01**
National Telecommunications and Information Administration, Boulder. CO. Inst. for Telecommunication Sciences.
Field Maxima Inside Habitable Structures Exposed to 2.45 GHz Plane Wave Radiation,
Hans J. Liebe. Oct 80, 47p NTIA/REPORT-80-49

This report discusses microwave engineering data relevant to assess the potential of the Satellite Power System (SPS) to cause microwave field enhancements (so-called 'hot spots') inside habitable structures (house, trailer, car, etc.) located in the fringe area of the receiving rectenna. Mitigative measures are included in the discussion.

PB81-156598 PC **A06**/MF **A01**
Transportation Systems Center, Cambridge, MA.
Directory of DOT Fire Research, 1979 Edition.
Final rept. May-Sep 80,
William T. Hathaway, and Stephanie H. Markos.
Dec 80, 111p DOT-TSC-OST-80-1
Prepared in cooperation with Raytheon Service Co.

This document presents the results of a survey of the fire safety projects conducted by the modal administrations of the U.S. Department of Transportation. Ongoing and recently completed modal fire safety projects for the period June 1978 to December 1979 are identified and presented. This survey updates project information previously contained in the report 'Assessment of Current U.S. Department of Transportation Fire Safety Efforts,' July 1979.

PB81-158305 PC **A08**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Annual Conference (4th) on Fire Research.
Final rept.,
Ileana M. Martinez, and Sonya M. Cherry. Dec 80, 169p NBSIR-80-2127-1

This report contains descriptions of the internal programs of the Center for Fire Research as well as extended abstracts of grants and contracts sponsored by the Center for Fire Research, National Bureau of Standards.

PB81-855025 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Remote Viewing Equipment. January, 1975-November, 1980 (Citations from the NTIS Data Base).
Rept. for Jan 75-Nov 80.
Dec 80, 61p NERACUSGNT2561

This bibliography covers the design, development and applications of remote viewing equipment. The equipment is used to inspect or view work areas that are exceptionally small, such as boreholes and the interior of steam pipes, or are hazardous, such as radiation environment. The abstracts cover sensors, manipulation, and viewing devices. Most of the applications pertain to the nuclear power industry. (Contains 51 citations, fully indexed and including a table of contents.)

13M. Structural Engineering

N81-16686/0 PC **A09**/MF **A01**
Tennessee Univ., Tullahoma.
Statistical Analysis of Atmospheric Turbulence About a Simulated Block Building.
Final Report.
S. L. Steely, Jr. Jan 81, 186p NASA-CR-3366
Contract NAS8-32692

An array of towers instrumented to measure the three components of wind speed was used to study atmospheric flow about a simulated block building. Two-point spacetime correlations of the longitudinal velocity component were computed along with two-point spatial correlations. These correlations are in good agreement with fundamental concepts of fluid mechanics. The two-point spatial correlations computed directly were compared with correlations predicted by Taylor's hypothesis and excellent agreement was obtained at the higher levels which were out of the building influence. The correlations fall off significantly in the building wake but recover beyond the wake to essentially the same values in the undisturbed, higher regions.

PB81-152308 PC **A05**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Input Identification from Structural Vibrational Response,
Yuxian Hu. Aug 80, 90p UCB/EERC-80/26, NSF/RA-800295
Grant NSF-PFR79-08261

The equivalent linearization method is applied to input identification from known structural response and system parameters, working in frequency domain. In addition to the commonly used one-model procedure, a two-model input identification procedure is proposed. Numerical examples of structural systems having elements of bilinear force-deformation relations are presented for different cases of stiffness, input motion and level of nonlinearity. Structural response obtained from true hysteretic loop analyses are used as the known responses with the unknown input motions to be identified. These identified motions are then compared with the real motions to check agreement with their maximum accelerations, response spectra, Fourier amplitude spectra, and acceleration time-histories. Shaking table tests of two three-story braced steel frames are used as examples to check the accuracy of the suggested input identification procedure. The bracing systems used, show strong nonlinearities due to buckling and material yielding. Sources of error in the analysis are discussed and possible improvements of the input identification procedure are suggested.

PB81-154072 PC **A04**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Experimental Testing of an Energy-Absorbing Base Isolation System,
James M. Kelly, Mark S. Skinner, and Karl E. Beucke. Oct 80, 73p UCB/EERC-80/35, NSF/RA-800297
Grant NSF-PFR79-08257
Sponsored in part by Malaysian Rubber Producers' Research Association, Brickendonbury (England).

The results of an experimental study of an aseismic base isolation system are described in this report. Commercially produced natural rubber bearings and tapered steel energy-absorbing devices are the primary components of the base isolation system. The steel energy-absorbing devices span the natural rubber bearings and connect the foundation to the base of the structure. Structural integrity under low-intensity excitations, such as those produced by wind forces, is maintained since the cantilever device remains stiff up to a predetermined level of loading. Once this level of loading has been exceeded, the devices yield and the natural rubber bearing base isolation system operates to isolate the structure from the damaging effects of high-intensity ground motion. Since the action of the energy-absorbing device is elastic-plastic, the performance of the isolation system is enhanced by the introduction of considerable hysteretic damping into the system upon yielding of the devices. After the energy-absorbing device had been subjected to a series of preliminary static tests designed to determine the hysteretic behavior of the device, the natural rubber bearings and devices were incorporated in an 80,000 lb structural model. The model was mounted on a twenty-foot square shaking table and subjected to a range of earthquake ground motion. Relative displacements at the natural rubber bearings were considerably lower with the devices installed, while structural accelerations were not increased significantly. Reduction of the displacements at the bearings of an isolation system such as that described here is necessary to ensure that the bearings remain stable under load. When both the energy-absorbing device and natural rubber bearings were in place, the structural model withstood simulated earthquake ground motions of extremely high intensity.

PB81-154304 PC **A10**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Shaking Table Testing of a Reinforced Concrete Frame with Biaxial Response,
Michael G. Oliva. Oct 80, 207p UCB/EERC-80/28, NSF/RA-800366
Grant NSF-PFR79-08257

The program in this report involved testing of a one third scale 2 story reinforced concrete frame, having rectangular section columns, with inelastic biaxial motion induced through earthquake excitation on a shaking table. Close inspection of the experimental response, and comparison with previous test results on a similar frame under pure uniaxial motion, found that biaxial motion seriously reduced the column yield strength. Local and global response characteristics indicated a tremendous amount of interaction between the rectangular column's strong axis motion and weak axis response. Weak axis stiffness was reduced to less than one third the initial value, through strong axis interaction, associated with narrow hysteretic load-deformation response, characteristic of a low energy absorption mechanism. Analytical correlation with experimentally measured response, considering response independently along the frame's major axes, was unsuccessful. Necessary modifications to current analysis techniques, for accurate modelling of multi-axial loading, including biaxial bending, of reinforced concrete members is discussed.

PB81-154312 PC **A08**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.

Inelastic Buckling of Steel Struts under Cyclic Load Reversals,
R. Gary Black, W. A. Bill Wenger, and Egor P. Popov. Oct 80, 172p UCB/EERC-80/40, NSF/RA-800299
Grants NSF-ENV76-04263, NSF-PFR79-08984
Sponsored in part by American Iron and Steel Inst., Washington, DC.

Cyclic axial loading experiments simulating severe seismic conditions are described for twenty-four structural steel struts of sizes and shapes typically employed as braces in small to moderately large steel buildings. The cross-sectional geometries of the specimens were also chosen to model the larger, heavier struts. Six of the twenty-four members were pinned at one end and fixed at the other, while the remaining eighteen were pinned at both ends. The range of cross-sectional shapes included wide flanges, double-angles, double-channels, structural tees, thin and thick-walled pipes, and thin and thick-walled square tubes. The responses of the specimens are evaluated and special attention paid to the effects of cross-sectional shape, end conditions, and slenderness ratio using hysteretic envelopes. While investigating the major parameters that influence a member's performance under cyclic loading, some important properties were recognized and quantified. Reduction factors were developed, which can account for the Bauschinger effect and initial curvature of struts. These factors can be used with an AISC code determined load to estimate the deteriorating compressive capacity of a strut during a few consecutive cycles of full inelastic load reversals. Some design recommendations are made for build-up members likely to experience severe load reversals.

PB81-154338 PC **A13**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Inelastic Seismic Analysis of Large Panel Buildings,
Vahid Schricker, and Graham H. Powell. Sep 80, 290p UCB/EERC-80/38, NSF/RA-800198
Grant NSF-PFR79-08257

Large panel structures behave differently from frame and monolithic wall structures because of the distinct planes of weakness in the horizontal and vertical joints between panels. These joints may slide and open during shaking, producing large localized changes in the bending and shear stiffnesses. Special modelling techniques are thus needed for analysis of the inelastic dynamic response. A mathematical model for inelastic seismic analysis of two-dimensional large panel structures is described. The wall panels are idealized either by elastic beam-type elements or by two-dimensional finite elements. The joints are idealized by nonlinear spring elements, with a variety of possible force-deformation relationships. FORTRAN subroutines for several panel and joint elements have been developed and incorporated into the computer program DRAIN-2D. To account for the large, sudden changes in stiffness in the mathematical model a modified step-by-step integration strategy has also been incorporated into the DRAIN-2D program. Using DRAIN-2D, a parameter study has been carried out on a multi-story, single-bay, large panel wall to determine the influence of design and analysis assumptions on the computed nonlinear response, considering both slip and opening at the joints. This report contains a review of the behavior of joints in large panel structures, a description of the modelling procedure and the DRAIN-2D elements, and a detailed discussion of the parameter study.

PB81-154593 PC **A05**/MF **A01**
California Univ., Berkeley. Earthquake Engineering Research Center.
Seismic Performance of Nonstructural and Secondary Structural Elements,
Isao Sakamoto. Jun 78, 80p UCB/EERC-78/10, NSF/RA-780770

A methodology is described for the evaluation of the damageability of nonstructural and secondary structural elements under seismic loading. In the first half of the report, problems associated with the assessment of the response of nonstructural elements to aseismic loading - including the classification of such elements and the damage to them, design methods, and methods of evaluation - are addressed. In the second half of the report, a general procedure is developed by which the damageability of secondary structural walls in existing buildings can be evaluated. Damageability is defined as a function of capacity to dissipate energy. A method whereby the mechanical behavior of nonstructural elements can be predicted is described. Acting models for the simulation of the mechanical behavior of assembly models - models of secondary wall systems comprised of unit models of elements within the system - are discussed and their implementation described and illustrated. Examples of the prediction of the mechanical behavior of secondary walls by the models mentioned above are described in the appendices to the report.

PB81-156473 PC **A04**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.
Load-Frequency Relationships for Shallow Elastic Arches,
E. R. Johnson, and R. H. Plaut. Feb 80, 70p VPI-E-80-4
Grant NSF-ENG77-17487

This report investigates load-frequency relationships for shallow elastic arches. The results are presented as characteristic curves, which are plots of the squares of the vibration frequencies versus a static loading parameter. The curve corresponding to the lowest frequency is called the fundamental characteristic curve. Properties of these curves, in particular the fundamental one, can provide insight into dynamic response and sometimes can be used to estimate vibration frequencies and buckling loads. In this report, a shallow arch with sinusoidal initial shape is treated. A sinusoidal distributed load is applied, and characteristic curves are determined for various values of the arch rise parameter. An asymmetric loading and general symmetric loading are also considered briefly. Circular arches are analyzed. Both pinned and clamped ends are considered, and the applied load is distributed uniformly over the span.

PB81-158222 PC **A16**/MF **A01**
Texas Univ. at Austin. Phil M. Ferguson Structural Engineering Lab.
Behavior Classification of Short Reinforced Concrete Columns Subjected to Cyclic Deformations,
K. A. Woodward, and J. O. Jirsa. Jul 80, 357p PMFSEL-80-2, NSF/RA-800378
Grant NSF-ENV77-20816

Guidelines were developed for describing and predicting the behavior of short reinforced concrete columns subjected to cyclic reversed deformations. The guidelines are presented in a flowchart encompassing a broad range of behavior. The end result is a unified approach to classifying and describing the hysteretic behavior of the columns. Eleven short columns were tested, the majority of which were subjected to cyclic deformations applied along two orthogonal axes. A constant compressive axial load was also applied to the majority of the columns. Results of the tests showed a wider range of behavioral characteristics than was expected. Based on test results, a predictive guide was developed to provide a rationale for understanding column behavior under cyclic loading conditions.

14. METHODS AND EQUIPMENT

14A. Cost Effectiveness

AD-A094 937/0 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
The Cost-Effectiveness of On-the-Job Training,
Polly Carpenter-Huffman. Feb 80, 16p Rept no. RAND/P-6451
Presented at the International Learning Technology Congress and Exposition (3rd), Feb 80, Washington, DC.

During the past few years the military services have been concerned about the cost and effectiveness of their On-the-Job Training (OJT) programs. These concerns have arisen from the recognition that in certain types of work situations, most notably those that generate urgent pressures for production, requirements for OJT may conflict with production so that either production is degraded or, more likely, OJT is done poorly, if at all. To cope with such problems, some operating units have formalized OJT by setting up classes and laboratories on site to teach as much of the job as possible in a structured setting (formal OJT). Withdrawal of people and equipment from operating units to conduct this training has raised questions about the relative efficiencies of the conventional and formal approaches. To address problems such as these, the Air Force is directing a large program of OJT research both in- and out of-house. In this paper are discussed the concepts of effectiveness and cost as applied to OJT. These concepts are key to explorations of policy questions such as: Is an OJT program as productive as it should, or can, be. How can an OJT program be made more useful. Is the OJT program overly costly. Would it be less expensive to provide OJT in some way other than is now being done.

14B. Laboratories, Test Facilities, and Test Equipment

AD-A094 736/6 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Parametric Study of Certain Forcing Functions Related to a Hypersonic Sled.
Master's thesis,
Victoria A. Tischler. Dec 80, 78p Rept no. AFIT/GAE/AA/80D-22

The rail roughness profile and the slipper stiffnesses are the important factors in determining the forcing function in the dynamic analysis of high speed rocket sleds. A parametric study involving a variation in the rail roughness profile and the slipper stiffnesses was performed. This study was carried out by interfacing the NASTRAN structural analysis program and a program called SLEDYNE developed for Holloman AFB. Using NASTRAN a free vibration analysis of the elastic sled body was made in order to obtain the natural frequencies and mode shapes. SLEDYNE simulates the sled ride on the rails and computes a set of inertial forces acting on all the mass points of the sled. The response of the sled to this inertial loading was determined by a NASTRAN static analysis. Two rail roughness profiles were considered, both based on the same set of track measurements, and three values of slipper stiffness were used. Response to the parametric study was measured by the total strain energy of the sled and the displacements of the mass points of the sled. (Author)

AD-A094 758/0 PC **A07**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Effect of Test Rhombus Size on Photon Correlation Laser Velocimeter Data.
Master's thesis,

Insha Hamid. Dec 80, 126p Rept no. AFIT/GAE/AA/80D-7

This thesis provides an experimental evaluation of the effects of test rhombus size on the photon correlation Laser Velocimeters. It also provides a method and results of laser beam expansion and beam diameter measurements. The study was carried out in the turbulent regime of a plane free jet 1 cm by 10 cm. The flow field measurements were made at 25 jet widths downstream of the nozzle exit, at M = 0.3, using 0.5, 1.0, 1.1, 3.0, 5.0., 7.0 and 10.0 mm diameter laser beams. The measurements taken were mean velocities and turbulence intensities which were then compared with the theoretical predictions and earlier experimental results. The Laser Velocimeter System provided accurate results for mean velocities, but was found to be limited at higher turbulence levels (above 20%) for beam diameters up to and less than 5.0 mm. (Author)

AD-A094 777/0 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Validation of the Wright-Patterson Vertical Wind Tunnel.
Master's thesis,
James W. Hickman. Dec 80, 56p Rept no. AFIT/GAE/AA/80D-10

A spin capability evaluation of the Wright-Patterson vertical wind tunnel was completed using a model of the Bell X-5. The X-5 model was previously spin tested in the NASA vertical wind tunnel at Langley AFB, Va. The study compared results obtained at the NASA-Langley vertical wind tunnel with the test results obtained at the Wright-Patterson vertical wind tunnel. The Langley results were used as the basis for this evaluation. Information was available on spin characteristics of the model with respect to various control surface configurations and recovery attempts using control deflections. The spin tests revealed a stable equilibrium spin and recovery, where applicable, could be established and observed for each corresponding stable equilibrium spin and recovery that was observed at Langley. (Author)

AD-A094 789/5 PC **A02**/MF **A01**
Sheffield Univ. (England). Dept. of Chemical Engineering and Fuel Technology.
Measurement of Fuel Spray Vaporisation by Laser Techniques.
Interim rept.,
A. J. Yule, C. Ah Seng, P. G. Felton, A. Ungut, and N. A. Chigier. Sep 80, 10p AFOSR-TR-81-0092
Grant AFOSR-77-3414
Proceedings of Symposium on Long Range and Short Range Optical Velocity Measurements, Saint Louis, MO, 15-18 Sep 80.

Comparison of fuel spray structures in heated and in cold environments is made by using a new laser tomographic technique and laser anemometry. The tomography technique is shown to give accurate and rapid 'point' measurements of droplet sizes and concentrations. Experimental results show acceleration of droplets to the local gas velocity, preferential vaporisation of the smallest droplets and the dispersion of droplets by the turbulence. (Author)

AD-A094 826/5 PC **A99**/MF **A01**
Rockwell International, Thousand Oaks, CA. Science Center.
Proceedings of the DARPA/AFML Review of Progress in Quantitative Nondestructive Evaluation, 8-13 July, La Jolla, California.
Annual rept. no. 5, 1 Jul 78-30 Sep 79,
Donald O. Thompson, and R. Bruce Thompson. Jul 80, 752p SC595.70AR, AFWAL-TR-80-4078
Contract F33615-74-C-5180

The edited transcripts of the DARPA/AF Review of Progress in Quantitative Nondestructive Evaluation (NDE) held on July 8-13, 1979, at Scripps Institution of Oceanography, La Jolla, California, are presented in this document. Several key topics form the core of these presentations and discussions. They include quantitative ultrasonics, eddy currents, emissions related to failure prediction, and reliability of metals and ceramics. It is believed that this document provides a reasonable summary of NDE research and development currently underway. (Author)

AD-A094 835/6 PC **A02**/MF **A01**
Harry Diamond Labs., Adelphi, MD.
Selection of an Optical Fiber for the Radiation Environment of the Satellite X-Ray Test Facility.
Technical memo.,
Timothy R. Oldham, James C. Blackburn, and Raine M. Gilbert. Jul 80, 20p Rept no. HDL-TM-80-22

The pulsed radiation environment of the proposed Satellite X-Ray Test Facility (SXTF) consists of synchronized pulses of low-energy plasma radiation and bremsstrahlung produced by 150-keV electrons. In addition, there is also a low level, steady spray of 1-MeV electrons. In the experiments reported here, pulsed irradiation was performed by using the Harry Diamond Laboratories FX-45 in the bremsstrahlung mode, and the steady state irradiation was performed by using a 60Co source. The SXTF fiber has to carry an analog signal during the radiation pulse with negligible distortion due to transient darkening or Cerenkov radiation. Several fibers were tested, and the IVPO fiber was found to be the best because it has very little transient darkening. Cerenkov radiation was effectively removed from all transmitted signals by using narrow optical bandpass filters. (Author)

AD-A094 968/5 PC **E11**/MF **E11**
Johns Hopkins Univ., Laurel, MD. Chemical Propulsion Information Agency.
JANNAF Safety and Environmental Protection Subcommittee Meeting (1980), Wright-Patterson AFB, Ohio, 22-24 July 1980,
John A. E. Hannum. Oct 80, 128p Rept no. CPIA-PUB-325
Contract N00024-78-C-5384
Availability: Chemical Propulsion Information Agency, Johns Hopkins Road, Laurel, MD 20810 (No copies furnished by DTIC).

The present work relates to the development of technology suitable for the field measurement of hypergolic propellants including Hydrazine (H), Monomethyl-hydrazine (MMH), and unsymmetrical-dimethylhydrazine (UDMH) at the parts-per-billion (PPB) level in air or a diluent gas. The Space Shuttle Transportation System and F-16 Aircraft programs, as well as other military and commercial users, will require the handling of large quantities of hydrazine (H, MMH, and UDMH). These compounds are highly toxic and recommended maximum exposure limits are 0.1 PPM for H, 0.2 PPM for MMH, and 0.5 PPM for UDMH. There is a need, therefore, for a measurement technique which can be used to aid compliance with health and safety regulations. This instrumentation should be capable of: (1) certifying that the work area is free from hydrazines contamination, (2) accurately measuring the hydrazines level to document exposures, (3) checking for leaks around valves, tanks and transfer lines, and (4) warning when hazardous situations occur. In this study, a real-time instrument was developed for the convenient measurement of hydrazine at PPB levels in the air. It was deployed initially at Kennedy Space Center for monitoring during operations. The important instrument features that allow for portable field operation as well as the important operating characteristics are discussed. (Author)

AD-A095 030/3 PC **A04**/MF **A01**
Pratt and Whitney Aircraft Group, West Palm Beach, FL. Government Products Div.
Spin Pit Application of Image Derotated Holographic Interferometry.
Final rept. 22 Oct 79-15 Sep 80,
J. L. Bearden, and J. F. Clarady. Sep 80, 52p PWA-FR-13041, AFWAL-TR-80-2083
Contract F33615-79-C-2071

This report describes the results of a program in which an experimental technique for image derotated holographic interferometry was developed to investigate the resonant response of a gas turbine engine bladed-disk assembly under controlled laboratory conditions of rotation and vibratory excitation. Image derotated holograms were taken for several modes of vibration of a rotating bladed disk at speeds up to 7,500 rpm in a laboratory spin test facility. (Author)

AD-A095 031/1 PC **A05**/MF **A01**
Arinc Research Corp., Annapolis, MD.
TMDE Modernization Program.
Technical rept. May-Dec 80,
A. Simmons, R. Kavanaugh, and B. Paiz. Jan 81, 86p Rept no. 1205-04-2-2368
Contract DAEA18-72-A-0005

The objectives of the review and analysis were to determine the minimum number of individual makes and models (M/M) of TMDE that would be required to replace the existing general purpose (GP) TMDE inventory, develop a Time-Phases Plan (TPP) for the TMP, and evaluate the impact of not completing the TMP on schedule. The minimum number of M/M required to replace the U.S. Army GP TMDE inventory is 73. This number may rise slightly if each mainframe and plug-in combination required to satisfy a specific LR is nomenclatured separately. An estimated 2,222 individual M/M of GP TMDE can be replaced by the 73 M/M. Several GP TMDE families and OTS ETE functional descriptions (FDs) that pertain to the required 73 M/M do not have corresponding LRs. These families should be reviewed and LRs prepared, if necessary. The OTS ETE FDs applicable to several of the LRs are out of date and should be reviewed, upgraded, and validated. The Nondevelopmental Item (NDI) acquisition process is applicable to the procurement of OTS ETE. This process was used to develop the TPP. The TPP provides the guidance necessary to implement the TMP and to determine initial resource requirements.

ANL/MSD/FE-80-7 PC **A03**/MF **A01**
Argonne National Lab., IL.
Development of Nondestructive Evaluation Techniques for High-Temperature Ceramic Heat Exchanger Components. Twelfth Quarterly Report, July-September 1980.
Oct 80, 39p
Contract W-31-109-ENG-38

Detection of electric-discharge machined notches in a silicon carbide tube by an ultrasonic bore-side probe under microcomputer control has been demonstrated. Use of the reflection mode has been shown to enhance the sensitivity of flaw detection with an acoustic microscope. In this configuration, the transducer and laser-scanned coverslip are both on the tube outer surface, eliminating the need to fill the tube with water. A conceptual design is presented for inspecting tubes up to seven feet long in both through-transmission and reflection-mode configurations. A comparison of NDE techniques for ceramic butt joints showed holographic interferometry to be generally better than dye-penetrant, radiographic, or ultrasonic techniques for characterizing a crack-like inner-wall defect. Pitch-catch and pulse-echo ultrasonic techniques also indicated the presence of an anomaly in the region identified as flawed via holography, while radiographic and penetrant-testing results were ambiguous. (ERA citation 06:008068)

DL/NUC/TM-52E PC **A02**/MF **A01**
Science Research Council, Daresbury (England). Daresbury Lab.
Performance of a 1.2M Long Distributed Parameter Delay Line.
R. A. Cunningham, and M. M. Przybylski. May 80, 18p
U.S. Sales Only.

A program of development work has been carried out to determine if a spatial resolution of < 1mm can be obtained using a single delay line over the 1.1 m length of the focal plane of the QMG/2 type magnetic spectrometer now being installed at the Nuclear Structure Facility at Daresbury. This memorandum describes the construction and performance of a 1.2 m line and compares its performance with that of a series of 300 and 600 mm lines whose design, testing and performance have already been described. (Atomindex citation 11:549168)

DOE/RA/10157-1 PC **A12**/MF **A01**
IIT Research Inst., Chicago, IL.
Design, Construction and Testing of a DC Bioeffects Test Enclosure for Small Animals. Final Report.
M. J. Frazier, and M. M. Preache. Nov 80, 274p
Contract FG01-78ET10157

This final report describes both the engineering development of a DC bioeffects test enclosure for small laboratory animals, and the biological protocol for the use of such enclosures in the testing of animals to determine possible biological effects of the environment associated with HVDC transmission lines. The test enclosure which has been designed is a modular unit, which will house up to eight rat-sized animals in individual compartments. Multiple test enclosures can be used to test larger numbers of animals. A prototype test enclosure has been fabricated and tested to characterize its electrical performance characteristics. The test enclosure provides a simulation of the dominant environment associated with HVDC transmission lines; namely, a static electric field and an ion current density. A biological experimental design has been developed for assessing the effects of the dominant components of the HVDC transmission line environment. (ERA citation 06:008315)

FE-2030-TR23 PC **A12**/MF **A01**
Pennsylvania State Univ., University Park. Coal Research Section.
Development and Evaluation of an Automated Reflectance Microscope System for the Petrographic Characterization of Bituminous Coals.
D. S. Hoover, and A. Davis. Oct 80, 275p
Contract AC01-76ET10615

The development of automated coal petrographic techniques will lessen the demands on skilled personnel to do routine work. This project is concerned with the development and successful testing of an instrument which will meet these needs. The fundamental differences in reflectance of the three primary maceral groups should enable their differentiation in an automated-reflectance frequency histogram (reflectogram). Consequently, reflected light photometry was chosen as the method for automating coal petrographic analysis. Three generations of an automated system (called Rapid Scan Versions I, II and III) were developed and evaluated for petrographic analysis. Their basic design was that of a reflected-light microscope photometer with an automatic stage, interfaced with a minicomputer. The hardware elements used in the Rapid Scan Version I limited the system's flexibility and presented problems with signal digitization and measurement precision. Rapid Scan Version II was designed to incorporate a new microscope photometer and computer system. A digital stepping stage was incorporated into the Rapid Scan Version III system. The precision of reflectance determination of this system was found to be +- 0.02 percent reflectance. The limiting factor in quantitative interpretation of Rapid Scan reflectograms is the resolution of reflectance populations of the individual maceral groups. Statistical testing indicated that reflectograms were highly reproducible, and a new computer program, PETAN, was written to interpret the curves for vitrinite reflectance parameters ad petrographic. (ERA citation 06:006872)

GKSS-80/E/2 PC **A03**/MF **A01**
GKSS - Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Physik.
Program to Calculate Local Flux Distributions and Mean Flux Values Averaged on the Total Sample Volume for Cylindrical Sources.
P. Rybaczok, and H. U. Fanger. 1980, 37p
In German.
U.S. Sales Only.

For sample activations in the cylindrical cavity of neutron tubes with concentric target arrangement, local flux distributions and mean flux values averaged on the total sample volume are important parameters. This paper presents an integration method and a corresponding computer program which is adequate for the solution of this problem. As an example, the computer output for a special geometry is given. (Atomindex citation 11:546355)

HEDL-SA-2180-FP PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Status of the Nondestructive Examination Equipment for the Fuels and Materials Examination Facility.
G. B. Frandsen. 18 Sep 80, 42p CONF-801107-54
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

The present status of Nondestructive Examination (NDE) Equipment proposed for the Fuels and Materials Examination Facility (FMEF) now under construction at the Hanford Engineering Development Laboratory is discussed. Items discussed include the NDE cell receiving machine, the dismantling machine, the standard examination stage, profilometry, eddy current, wire wrap removal machine, surface examination, gamma scan and general NDE equipment. (ERA citation 06:006355)

HEDL-SA-2184-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Standard Examination Stage for the Fuels and Materials Examination Facility.
J. W. Hess, and G. B. Frandsen. 18 Sep 80, 25p CONF-801107-47
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

A Standard Examination Stage (SES) has been designed, fabricated, and tested for use in the Fuel and Materials Examination Facility (FMEF) at the Hanford Reservation near Richland, WA. The SES will perform multiple functions in a variety of nuclear fuel, absorber, and blanket pin handling, positioning, and examination operations in 11 of 22 work stations in the FMEF Nondestructive Examination (NDE) cell. Preprogrammable, automated, closed loop computer control provides precision positioning in the X, Y and Z directions and in pin rotational positioning. Modular construction of both the mechanical hardware and the electrical and control system has been used to facilitate in-cell maintainability. (ERA citation 06:006356)

IEA-DT-105 PC **A04**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Design and Construction of a Triple-Axis Crystal Neutron Spectrometer and Performance Testing by Means of Measurements of Dispersion Relations in Copper.
C. Fuhrmann. Mar 79, 71p
In Portuguese.Thesis.
U.S. Sales Only.

The Triple-Axis Crystal Neutron Spectrometer is the best instrument for the study of lattice dynamics, when the neutron inelastic scattering technique is used. Design, construction and operation of a triple-axis crystal neutron spectrometer, whose construction was recently finished at IEA are described. The design principles employed are directed to mechanical simplicity, facility of construction and flexibility in operation, with no adapted components to industrial applications were used in the construction. The operational characteristics of the spectrometer, such as the neutron wavelenght of the incoming beam and the resolution have been determined. With the purpose to check the performance of IEA Triple-Axis Crystal Neutron Spectrometer, dispersion relation curves for copper, at room temperature, have been measured. The frequency of phonons propagating along three major symmetry directions have been determined. The measurements were carried out operating the Triple-Axis Spectrometer in the 'sup(implies)Q-constant' mode. An excelent agreement could be observed between the results obtained in the present experiment and the data for copper presented in the literature. This comparison indicates that the IEA Triple-Axis Crystal Neutron Spectrometer is in good operational conditions and is able to perform original experiments. Details on the experimental procedures for the case of a Triple-Axis Spectrometer operating in 'sup(implies)Q-constant' mode are also presented. (Atomindex citation 11:552958)

IPNO-PhN-79-21 PC **A05**/MF **A01**
Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.
Spectrometer Using One or Two Superconducting Coaxial Solenoids.
J. P. Schapira, S. Gales, and J. P. Laurent. Jun 79, 88p
In French.
U.S. Sales Only.

A set of two superconducting solenoidal coils which are presently under construction at the Orsay I.P.N. is described. Because of its optical properties, the system can be used as spectrometer: focusing properties with small geometrical aberrations allowing large solid angles to be used together with good transmission and isochronism. Various types of experiments can be envisaged with such a device: angular correlation at zero degree, study of rare events like exotic reactions, time of flight for mass identification and rapid (much less than 1 mu s) and efficient collection of radioactive nuclei for subsequent spectroscopy measurements. (Atomindex citation 11:526021)

JINR-R-9-12517 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods.
Hall Magnetometers for Stationary Magnetic Fields with Registration in the Magnetic Field Units.
V. M. Lachinov, V. K. Makoveev, and A. M. Starikov. 1979, 21p
In Russian.
U.S. Sales Only.

Magnetometers based on Hall probes and operational amplifiers for stationary magnetic field measurements are considered. They have a simple design-a number of measuring channels, the gradient measuring channel and enable measurements in units of magnetic field. Using digital voltmeters the measurement accuracy equals about (1-2)x10 exp -4 for the magnetic fields of about 2.5 T. In the one channel magnetometer of MPKh-1M type a measurement mode with improved channel linearity has been realized and the internal automatic digital detector has been introduced. Hall magnetometers proved to be reliable and had high stability in operation. (Atomindex citation 11:531897)

JINR-R-9-12687 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Multipole Magnetic System for Calibrating Harmonic Induction Magnetic-Field Sensors.
M. A. Voevodin, A. D. Kovalenko, N. A. Korukov, and Yu. I. Tikhomirov. 1979, 8p
In Russian.
U.S. Sales Only.

A precise multipole magnetic system for calibrating the search coils is described. One hundred and twenty copper wires each 100 cm long are positioned equidistantly with step of 3 deg along a plexiglass cylinder, which outer diameter is 150 mm, and surrounded by ferromagnetic shield. The wires are connected in series in several groups with alternate current directions. The amount of groups and wires in them are chosen in accordance with field harmonic to be generated. For multipoles higher than dipole the accuracy of field better than 1 per cent is realized. The maximum magnitude of field in dipole is equal approximately to 200 Oe under current amplitude of about 60A. The results of experimental test of the arrangement are presented. (Atomindex citation 11:532204)

JINR-10-12764 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
Autonomous System for Goniometer Control.
O. I. Elizarov, Ya. Erzhabek, G. P. Zhukov, K. Ondreichka, and I. M. Salamatin. 1979, 11p
In Russian.
U.S. Sales Only.

Hardware and software of goniometer control system (GCS) performed in CAMAC standard is described. It consists of a crate of controller performed on the base a K5801K80 microprocessor memory units for storage programs and data as separate CAMAC modules, a goniometer control module, control units for separate axes and digital display. To store programs the memory device on the base of reprogrammable constant memory devices is used. The goniomcontrol module serves as an interface between crate controller and control units for separate axes of goniometer. It permits to test current position of axes (angles of turn form coordinate origin) which is especially important for reliable operation of the system. The software consists of a monitor, goniometers, driver, and set of applied programs. It provides the com-

munication of operator with the GCS. (Atomindex citation 11:532187)

JINR-13-12782 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions.
Multidimensional Analyzer Based on the MACAMAC System.
1979, 8p
In Russian.Hungarian symposium "Microprocessors-79", Budapest, Hungary, 1979.
U.S. Sales Only.

General information about multidimensional analyzer based on the MACAMAC system is given. The analyzer includes the 1521 microprocessor controller and the 1522 memory modules of the "Borer" firm (Switzerland), CAMAC modules: ADCs, coincidence organization module, display driver, paper tape input and output modules. The Videoton-34O serves as a terminal, and for data visualization the RG-96 display device is used. The analyzer software includes a monitor, data acquisition programs, display program and users' programs. The monitor organizes user-system dialogue by means of terminal keyboard. (Atomindex citation 11:549497)

KAERI-198/RR-67/79 PC **A04**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Development of Non-Destructive Testing. Eddy Current Testing.
D. Y. Park, and Y. S. Moon. 1979, 65p
In Korean.
U.S. Sales Only.

The principle of the eddy current testing which became one of the essential nondestructive testing for the inservice inspection of nuclear power plant was studied. An eddy current testing instrument, FD-5110-ERM (made in Japan) was purchased in August, 1978 and was used for studying the various eddy current testing methods. Because of its inherent advantage over other nondestructive testing methods for tube test, the eddy current testing became almost unique testing method for the heat exchange tube and the condenser tube in the inservice inspection of nuclear power plant. In November we had participated in the inservice inspection of Kori nuclear power plant and had accumulated the technical experience in the practical application of eddy current testing and some of the results are described in this report. (Atomindex citation 11:549241)

LA-8640-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Collection Efficiency of Field Sampling Cassettes.
C. I. Fairchild, M. I. Tillery, J. P. Smith, and F. O. Valdez. Dec 80, 23p
Contract W-7405-ENG-36

Industrial hygiene particulate samples are often collected under anisokinetic sampling conditions and in crosswinds. Experiments were conducted to quantitate errors associated with sampling under these nonideal conditions. Three types of field sampling cassettes were tested to determine particle sampling efficiencies for 0, 2, and 5 m/s winds at incidence angles of 0, 90, and 180 exp 0 . Tests were conducted in a chamber in which the cassettes or filter holders were moved to generate a relative wind. Eight filter cassettes mounted symmetrically on a horizontal arm which rotated about a vertical shaft at 250 rpm were positioned so that four cassettes moved at 2 m/s and four at 5 m/s. In addition to two each of the test cassettes, two in-line filter cassettes equipped with isokinetic probes were mounted on the arm. Mass, or number of particles, collected by test cassettes and isokinetic samplers was compared to that collected by stationary filters placed near the rotating arm. Results from tests in the rotating arm chamber were checked against similar tests made in a turbulent flow wind tunnel. Sampling efficiencies were compared to theoretical values calculated from Belyaev and Levin's theory, and Davies' modification for calm air sampling. Satisfactory agreement was obtained for 5- mu m D/sub ae/ particles; however, considerable discrepancy was noted with larger particles. The results indicate that corrections must be made to determine concentration when particles collected under nonideal sampling conditions are larger than approx. 5- mu m D/sub ae/. (ERA citation 06:008112)

NUREG/CR-1885 PC **A03**/MF **A01**
Southwest Research Inst., San Antonio, TX.
Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT UT).
Progress rept.,
J. L. Jackson. Jan 81, 42p
Contract NRC-04-77-145

The purpose of the project is to validate the usefulness of SAFT UT for industrial nondestructive evaluations (NDE). SAFT UT is an ultrasonic imaging method for accurate measurement of the spatial location and extent of acoustically reflective surfaces (flaws) contained in objects such as structural components and weldments in nuclear power reactor systems. The increased measurement accuracy offered by SAFT, when compared with that provided by measurement methods now in use, will improve the reliability of flaw severity assessments with resultant safety and economic benefits to the nuclear power industry.

N81-16069/9 PC **A03**/MF **A01**
European Space Agency, Paris (France).
Gravimetric Investigation of the Particle Number Density Distribution Function in the High Speed Cascade Wind Tunnel for Laser Anemometry Measurements.
H. Bessling, and T. Hinz. Sep 80, 34p ESA-TT-625, DFVLR-FB-79-12
Transl. Into English of "Gravimetrische Untersuchung der Partikelzahldichteverteilungsfunktionen im Hochgeschwindigkeits Gitterwindkamal fuer Laser Anemometrische Messungen", Dfvlr-FB 79-12, Brunswick, Jan. 1979 38 p. Original Report in German Previously Announced as X80-75089. Original German Report Available from Dfvlr, Cologne Dm 8,50.

Laser anemometry requires a minimum concentration of scattering particles in the flow. Before an L2F velocimeter could be used, the natural dust content in the low pressure tank of the high speed cascade wind tunnel had to be evaluated for this type of measurement. A Coulter counter was used for the necessary dust analysis by the gravimetric method. The result showed that the behavior of the particle number density distribution functions is dynamic and particularly dependent upon the flow velocity. A self cleaning effect, which is very important for laser anemometry, was found to make the tunnel dust free in the minimum amount of time, and a model concept was developed to explain the loss mechanism.

N81-16429/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Specifying and Calibrating Instrumentations for Wideband Electronic Power Measurements.
D. J. Lesco, and D. H. Weikle. Dec 80, 20p
NASA-TM-81545, DOE/NASA/1044-8
Contract EC-77-A-31-1044

The wideband electric power measurement related topics of electronic wattmeter calibration and specification are discussed. Tested calibration techniques are described in detail. Analytical methods used to determine the bandwidth requirements of instrumentation for switching circuit waveforms are presented and illustrated with examples from electric vehicle type applications. Analog multiplier wattmeters, digital wattmeters and calculating digital oscilloscopes are compared. The instrumentation characteristics which are critical to accurate wideband power measurement are described.

N81-16625/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Laboratory Measurements of Selected Optical, Physical, Chemical, and Remote-Sensing Properties of Five Water Mixtures Containing Calvert Clay and a Nonfluorescing Dye.
J. W. Usry, C. H. Whitlock, L. R. Poole, and W. G. Witte, Jr. Jan 81, 42p NASA-TM-81896

Total suspended solids concentrations ranged from 6.1 ppm to 24.3 ppm and sizes ranged between 1.5 micrometers and 10 micrometers with the most frequently occurring size less than 2 micrometers. Iron concentration was less than 1 percent of the total suspended solids. Nonfluorescing dye concentrations of the two mixtures were 20 ppm and 40 ppm. Attenuation coefficient for the five mixtures ranged from 4.8/m to 21.3/m. Variations in volume scattering function with phase angle were typical. Variations in attenuation and absorption coefficient with wavelength were similar for the mixtures without the dye. Attenuation coefficient of the mixtures with the dye increased for wavelengths less than 600 nm due to the dye's strong absorption peak near 500 nm. Reflectance increased as the concentration of Calvert clay increased and peaked near 600 nm. The nonfluorescent dye decreased the magnitude of the peak, but had practically no effect on the variation for wavelengths greater than 640 nm. At wavelengths less than 600 nm, the spectral variations of the mixtures with the dye were significantly different from those mixtures without the dye.

N81-16682/9 PC **A04**/MF **A01**
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
Zero-Gravity Aerosol Behavior.
Final Rept.,
H. W. Edwards. Jan 81, 62p NASA-CR-3384
Contract NAS8-31673

The feasibility and scientific benefits of a zero gravity aerosol study in an orbiting laboratory were examined. A macroscopic model was devised to deal with the simultaneous effects of diffusion and coagulation of particles in the confined aerosol. An analytical solution was found by treating the particle coagulation and diffusion constants as ensemble parameters and employing a transformation of variables. The solution was used to carry out simulated zero gravity aerosol decay experiments in a compact cylindrical chamber. The results demonstrate that the limitations of physical space and time imposed by the orbital situation are not prohibitive in terms of observing the history of an aerosol confined under zero gravity conditions. While the absence of convective effects would be a definite benefit for the experiment, the mathematical complexity of the problem is not greatly reduced when the gravitational term drops out of the equation. Since the model does not deal directly with the evolution of the particle size distribution, it may be desirable to develop more detailed models before undertaking an orbital experiment.

PATENT-4 245 494 Not available NTIS
Department of Agriculture, Washington, DC.
Inlet System for Direct Gas Chromatographic and Combined Gas Chromatographic/Mass Spectrometric Analysis of Food Volatiles.
Patent,
Michael G. Legendre, and Gordon S. Fisher.
Filed 26 Feb 79, patented 20 Jan 81, 9p PB81-162240, PAT-APPL-6-015 507
Supersedes PB-297 893.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An apparatus for analyzing volatile components from raw or processed food products using either direct gas chromatography or combined direct gas chromatography and mass spectrometry is disclosed. An inlet assembly containing a sample is appropriately affixed to a means of supplying helium carrier gas. Volatiles are driven off the sample and fed to a condenser assembly where the moisture is removed. The resultant moisture free volatiles are fed to a gas chromatograph or combined direct gas chromatograph and mass spectrograph for analysis.

PB81-139990
(Order as PB81-139859, PC **A05**/MF **A01**)
National Inst. of Metrology, Beijing (China).
Laser Interferometric Measurements of Very Small Vibration Amplitudes of the Order of Angstroms and its Applications,
Dong Xianquan, Yu Zhongmin, and Li Wenlong.
28 Mar 80, 6p
Included in Scientia Sinica, v25 n12 p1037-1041 Dec 80.

Two laser interferometric methods for measuring very small vibration amplitudes are described in this paper. One of these is an improved J sub

1max method. (J, is the Bessel function of the first kind of the first order). For original J sub 1max method, the vibration source to be measured must be excited to a specified amplitude in advance, which is 927 A when a helium neon laser is used. The photoelectric interferometric signals due to the specified vibration arc sent through a BPF tuned to the vibration frequency and the output of the BPF is as a reference value . For the improved method, however, there is some difference -- the previously specified vibration of a reference mirror instead of that a vibration of source is taken as a reference . For the other method, BPF is unnecessary, for it only requires that the vibration of the reference mirror is greater than 1/8 of the wavelength of the laser beam used.

PB81-151656 PC **A14**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Report of the National Conference on Weights and Measures (65th), 1980 Held at Washington, DC. on June 23-27, 1980,
Harold F. Wollin, Louis E. Barbrow, and Ann P. Heffernan. Jan 81, 319p NBS-SP-599
Library of Congress catalog card no. 26-27766. See also PB80-175128.

This is the proceedings of the 65th National Conference on Weights and Measures, sponsored by the National Bureau of Standards, held in Washington, DC., June 22-27, 1980, and attended by State, county, and city weights and measures officials, and representatives of the Federal Government, business, industry, and consumer organizations. The publication includes papers presented by Conference officials and other top authorities from Government and industry in the United States and several foreign countries. Reports by the several standing and annual committees of the Conference are also included. Major issues discussed at the National Conference include measurement science education, enforcement uniformity, national type approval, computers and microelectronics, new design and performance requirements for weighing and measuring technology, radiation measurements, metric conversion of retail gasoline dispensers, and weights and measures program evaluation.

PB81-154106 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Semiconductor Technology Program: Progress Briefs.
Interim rept. Apr-Jun 80,
W. Murray Bullis. Oct 80, 13p NBSIR-80-2006-3
Sponsored in part by Defense Advanced Research Projects Agency, Arlington, VA., Department of Energy, Washington, DC., Defense Nuclear Agency, Washington, DC., Charles Stark Draper Lab., Inc., Cambridge, MA.

This report provides information on the current status of NBS work on measurement technology for semiconductor materials, process control, and devices. Results of both in-house and contract research are covered. Highlighted activities include: optical linewidth and thermal resistance measurements, device modeling, dopant density profiles, resonance ionization spectroscopy, and deep-level measurements. Brief descriptions of selected on-going projects are included, and recent publications and publications in press are listed. Standardized oxide charge terminology developed by a joint IEEE-ECS committee is also described. The report is not meant to be exhaustive, contacts for obtaining further information are listed.

PB81-154114 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Semiconductor Technology Program: Progress Briefs.
Interim rept. Apr-Jun 79,
W. Murray Bullis. Aug 79, 12p NBSIR-79-1591-4
Sponsored in part by Defense Advanced Research Projects Agency, Arlington, VA., Department of Energy, Washington, DC., Defense Nuclear Agency, Wshington, DC., and Charles Stark Draper Lab., Inc., Cambridge, MA.

This report provides information on the current status of NBS work on measurement technology for semiconductor materials, process control, and devices. Results of both in-house and contract research are covered. Highlighted activities include studies of: laser annealing of silicon, dopant density profiles, silicon dioxide film thickness standards, intrachip linewidth variation, photoresist sensitometry, optical linewidth measurements, optical imagery calculations, and moisture measurement by mass spectroscopy. In addition, brief descriptions of new and selected on-going projects are given. The report is not meant to be exhaustive; contacts for obtaining further information are listed. Compilations of recent publications and publications in press are also included.

PB81-154122 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Semiconductor Technology Program: Progress Briefs.
Interim rept. Jul-Sep 79,
W. Murray Bullis. Dec 79, 16p NBSIR-79-1591-5
Sponsored in part by Defense Advanced Research Projects Agency, Arlington, VA., Department of Energy, Washington, DC., Defense Nuclear Agency, Washington, DC., and Charles Stark Draper Lab., Inc., Cambridge, MA.

This report provides information on the current status of NBS work on measurement technology for semiconductor materials, process control, and devices. Results of both in-house and contract research are covered. Highlighted activities include, modeling of diffusion processes, analysis of model spreading resistance data, and studies of resonance ionization spectroscopy, resistivity-dopant density relationships in p-type silicon, deep level measurements, photoresist sensitometry, random fault measurements, power MOSFET thermal characteristics, power transistor swithcing characteristics, and gross leak testing. In addition, brief descriptions of new and selected on-going projects are given. The report is not meant to be exhaustive; contacts for obtaining further information are listed. Compilations of recent publications and publications in press are also included.

PB81-157968 Not available NTIS
National Bureau of Standards, Washington, DC.
A Standards Program for Ac Losses in Superconductors.
Final rept.,
R. Radebaugh, G. Fujii, D. T. Read, and A. F. Clark. 1980, 4p
Pub. in Proceedings on International Congress of Refrigeration (15th), Venice, Italy, September 23-29, 1979, Session A 1/2, Paper 10 in Progress in Refrigeration Science and Technology, 4p 1980.

The final goal of the program is to establish standard measurement practices and a standard reference material for calibration of apparatus. In this paper the authors discuss a comparison of several techniques for measuring ac losses in superconductors. The techniques are divided into either a calorimetric or electronic type.

PB81-803918 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Optical Range Finders. 1964-1980 (Citations from the NTIS Data Base).
Rept. for 1964-80.
Feb 81, 203p
Supersedes PB80-803737, and NTIS/PS-78/1332.

The cited reports discuss the design, performance, theory, and a few applications of optical range finder equipment and systems. Laser range finders are prominently mentioned. Both terrestrial and space applications are considered. (This updated bibliography contains 194 citations, 16 of which are new entries to the previous edition.)

PB81-803926 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Optical Range Finders. 1970-1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-80.
Feb 81, 114p
Supersedes PB80-803745, and NTIS/PS-78/1333.

The design, performance, theory, and some applications of optical range finder equipment and systems are investigated in these reports from a worldwide literature survey. Laser range finders are included. Both terrestrial and space applications are considered. (This updated bibliography contains 106 citations, 9 of which are new entries to the previous edition.)

PB81-804056 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Magnetometers. 1964-1980 (Citations from the NTIS Data Base).
Rept. for 1964-80.
Feb 81, 247p
Supersedes PB80-803752, and NTIS/PS-78/1305.

The cited reports discuss the theory, design, performance, and calibration of various types of magnetometers. Only equipment studies are included; reports describing only applications or processing of data are generally excluded. (This updated bibliography contains 240 citations, 16 of which are new entries to the previous edition.)

PB81-804064 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Magnetometers. 1970-1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-80.
Feb 81, 244p
Supersedes PB80-803760, and NTIS/PS-78/1306.

The cited reports from a worldwide literature survey discuss the theory, design, performance, and calibration of various types of magnetometers. Only equipment studies are included; reports describing only applications or processing of data are generally excluded. (This updated bibliography contains 237 citations, 24 of which are new entries to the previous edition.)

PB81-857997 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Plasma Jet Wind Tunnel. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Jan 81, 56p NERACIAANT2537

The citations in this bibliography cover plasma ignition of an arc in wind tunnel coaxial heaters, electron energy balance in a glow-discharge plasma, slow ions in plasma wind tunnels, free jets in an arc heated wind tunnel, plasma studies in hot shot wind tunnels, development of an ion rocket engine, and ion temperature in an ionosphere wind tunnel. Plasma wind tunnel for magnetohydrodynamics and the magnetic channeling of supersonic axisymmetric plasma jets are also included in this bibliography. (Contains 48 citations, fully indexed and including a table of contents.)

PB81-858052 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Bolometers. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 64p NERACSPNNT2742

This retrospective bibliography contains citations concerning various types of bolometers and their application to the detection and measurement of low intensity thermal radiation, especially for the study of infrared spectra. Some attention is given to the fabrication and performance of bolometers. (Contains 64 citations, fully indexed and including a table of contents.)

RFP-2964 PC **A02**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.
Evaluation of Ultrasonic Signals from Diffusion and Eutectic Bond Interfaces.
C. M. Brown. 10 Dec 80, 25p
Contract AC04-76DP03533

A research program is in progress at Rocky Flats to determine correlations between ultrasonic

signal content and diffusion or eutectic bond joint condition, and to develop a computer-controlled scanning, data acquisition and analysis system which utilizes these correlations and waveform analysis techniques. The initial efforts to determine effective ultrasonic waveform parameters to characterize the strength of bond interfaces is complete. A development version of a computer-controlled, automated scanning and data acquisition system is in operation. (ERA citation 06:008073)

UCRL-52532(V.4)(Pt.7) PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Computer Automation of Continuous-Flow Analyzers for Trace Constituents in Water. Volume 4. Description of Program Segments. Part 7. TAA01.
R. W. Crawford. 25 Apr 79, 35p
Contract W-7405-ENG-48

This report describes program segment TAA01 used in automating the Technicon AutoAnalyzer(TAA) data. The program retrieves data from the TAAID.XX files, stores them in sequential files suitable for rapid printing, and, if Reagent Blanks are used in the run, prints a preliminary report of peak heights and concentrations. A sequence list and flow chart describe the functions of each coding group. The appendices contain a detailed description of the contents and junctions of each section and subroutine, list and define all arrays, strings, and variables, and provide a sample program listing with a complete list of references and symbols. (ERA citation 06:008095)

UCRL-52532(V.4)(Pt.9) PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Computer Automation of Continuous-Flow Analyzers for Trace Constituents in Water. Volume 4. Description of Program Segments. Part 9. TAA03.
R. W. Crawford. 25 Apr 79, 46p
Contract W-7405-ENG-48

This report describes TAA03, the ninth program in the series of programs necessary to automate the Technicon AutoAnalyzer. This document includes a flow chart and sequence list that describes and illustrates the function of each logical group of coding, and a description of the contents and function of each section and subroutine. In addition, all arrays, strings, and variables are listed and defined, and a sample program listing with a complete list of symbols and references is provided. (ERA citation 06:008096)

ZfK-405 PC **A02**/MF **A01**
Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German D.R.)
Measurement of the Frequency Response of Electromechanical Transducers by the Electrostatic Method.
W. Schulz. May 80, 14p
In German.
U.S. Sales Only.

An electrostatic method for the measurement of the frequency response of electromechanical transducers is presented. The mechanical excitation of the transducers is due to the forces acting in a capacitor according to Coulomb's law of forces. A calibration device was developed and the frequency response of piezoelectric pressure transducers has been investigated for frequencies up to 200 kHz and temperatures up to 500 exp 0 C. (Atomindex citation 11:552827)

14D. Reliability

AD-A095 066/7 PC **A04**/MF **A01**
California Univ., Berkeley. Operations Research Center.
Load Sharing Models and Their Life Distributions.
Research rept.,
Zvi Schechner. Sep 80, 57p Rept no. ORC-80-19 Grant AFOSR-77-3213

An N-component parallel system is subjected to a known load program. As time passes, components fail in a random manner which depends on their individual load histories. At any time t, the surviving components share the total load according to some rule. The system's lifetime distribution is studied under various breakdown rules. Under the linear breakdown rule it is shown that if the load program is increasing the system lifetime is IFR. Using the notion of Schur convexity, stochastic comparison of difference systems is obtained. It is also shown that the system failure time is asymptotically normally distributed as the number of components grows large. All these results hold under various load sharing rules, in fact, one can prove that the system lifetime distribution is invariant under different load sharing rules. For a more general breakdown rule only the equal load sharing is considered. The asymptotic distribution of the system lifetime is shown to be normal. The asymptotic mean and variance are derived. (Author)

14E. Reprography

AD-A094 753/1 PC **A02**/MF **A01**
Army Armament Research and Development Command, Dover, NJ. Product Assurance Directorate.
AXIS: A Computer's Eye View of an X-Ray.
Interim rept.,
Joseph M. Argento. Jan 81, 24p ARPAD-TR-80001, AD-E400 541

Human subjectivity and fatigue have long been a problem in x-ray interpretation. AXIS is a program to remove these problems from x-ray reading. To accomplish this, the process of film reading is being automated. X-ray radiographs of actual shell are being analyzed and from this analysis computer algorithms are being developed to characterize both the digital image of the shell and anomalous points on the shell image. The system will be installed in an ammunition plant and will be used as the film interpreter in an actual munition line. To keep up with production, ingenious use is being made of a device called an array processor. This device allows many computer operations to be accomplished simultaneously. The array processor will permit analysis of the radiographic image in about ten seconds. This report describes the basic techniques used to analyze a radiograph and also some of the equipment that will be used in the final system.

AD-A095 078/2 PC **A03**/MF **A01**
Arizona Univ., Tucson. Optical Sciences Center.
Determination of the Effects of Defocus and Information Content.
Final rept. 1 Jan-31 Dec 77,
R. R. Shannon, and S. Sagan. May 78, 34p SD-TR-80-72
Contract F04701-77-C-0059
Report on Optical Power Spectrum Analysis.

The concept of signal-to-noise power spectrum description of photographic imagery is extended to include transfer function losses and information content. A coherent optical processor is used for quantifying image content. Experiments show that theoretical predictions are verified. The determination of the objective level of quality or information content of technical photography is a subject of much interest. The use of specific targets for the production of numeric data, such as resolution or modulation transfer factor, is applicable only in cases where the original object is available for attaching a particular target. In many cases the desired general image description must be obtained from the natural imagery collected on the photographic negative. The use of a coherent optical processor for carrying out this measurement is a useful approach. Such applications are not novel, in that several authors have reported on this approach. In the Shannon and Cheatham work, a method of describing the OPS characteristics by use of a 'signal-to-noise power spectrum' method was developed. This concept, referred to as the SNPS function, succeeded in compressing the huge dynamic range of the observed image signal and the photographic and processor noise into a relatively simple function.

AD-A095 131/9 PC **A05**/MF **A01**
Arizona Univ., Tucson. Optical Sciences Center.
Active Mirror Holographic Interferometry.
Final rept.,
R. R. Shannon, and W. S. Smith. Sep 78, 81p SD-TR-80-71
Contract F04701-75-C-0106

The concept of a completely integrated optical mirror and support structure for use in large astronomical telescopes was studied. The mirror would have a complex substructure consisting of an arrangement of double triangular active supports. These supports would provide stiffness in two directions at 41 support points. The support points would be modular and be linked together. Two active optical systems were analyzed: a 33 actuator system and a 41-actuator system. A 60-cm aperture system was designed and constructed with three active and 38 stationary supports. (Author)

AD-A095 157/4 PC **A03**/MF **A01**
Image Graphics, Inc., Fairfield, CT.
Development of High Speed CRT Print Head Systems for Cartographic Applications.
Final technical rept. Jun 76-Feb 80,
Patrick F. Grosso. 15 Feb 80, 49p 3001, ETL-0213
Contract DAAG53-76-C-0182

The CRT 2000 Print Head System is a high speed, large format, flatbed plotter photocomposition system developed for the Defense Mapping Agency (DMA) to produce color separation film masters for maps and charts from digital names/symbols and cartographic data. The color separations are used to prepare press-ready printing plates for conventional multi-color printing presses for the printing of color charts and maps. Three engineering models of CRT 2000 Print Heads were developed, installed and integrated with government owned Plotter Tables at the Defense Mapping Agency's Hydrographic, Topographic and Aerospace Centers located in Washington, D.C. and St. Louis, MO. respectively. (Author)

N81-16134/1 PC **A09**/MF **A01**
Martin Marietta Corp., Denver, CO.
Nonmetallic Materials Contamination Studies.
Final Technical Report, 2 Apr. 1979 - 14 Nov. 1980.
J. A. Muscari, and G. Beverlin. 16 Dec 80, 187p NASA-CR-163890, JPL-9950-470
Contracts NAS7-100, JPL-955426
Prepared for JPL.

In order to impose adequate contamination control requirements in the selection of Wide Field Planetary Camera (WFPC) materials and to develop a data base of potential optical degradation of the WFPC charge-couple device window, the outgassing properties of WFPC materials and the collected volatile condensed material (CVCM) effects on MgF2 transmittance were measured. Changes in the transmittance were monitored in the wavelength region from 115 nm to 300 nm for selected CVCM thicknesses up to 150 nm. The outgassing properties of reemitted CVCM were also studied.

PB81-157059 PC **A04**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Workplace Safety Symbols: Current Status and Research Needs,
Neil D. Lerner, and Belinda L. Collins. Mar 80, 63p NBSIR-80-2003
Sponsored in part by National Inst. for Occupational Safety and Health, Rockville, MD.

Although written signs are a common means of conveying safety information in the workplace, pictographic symbols can be a more effective way of providing the same information. Symbols are independent of a particular written language, and can be more accurately and rapidly perceived than the comparable work message. Despite the many advantages of safety symbols, they can be ineffective or even dangerous if the intended meaning is not accurately communicated. As a result, there is a great need for careful evaluation, consistent ap-

plication, and eventual standardization for safety symbols. This report documents an initial assessment of current symbol use and future requirements. It includes a review of the technical literature on symbol research; observation of safety sign and symbol use in the workplace; compilation of commercially available symbol referents; and review of national and international standards. Based upon these sources, an initial list of 40 symbol referents is presented along with research priorities for evaluating the effectiveness of symbols for these referents.

PB81-159246
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Photographic Chemistry.
Sensitization and Stabilization of Photographic Emulsions by Triazaindolizine Stabilizers,
Zeng Fanjie. 7 Apr 79, 8p
Included in Scientia Sinica, v23 n10 p1258-1265 Oct 80.

The influence of 5-methyl-7-hydroxy-1,3,4-triazaindolizine (Birr stabilizer) and its isomer upon the storage stability of high-speed negative emulsions are studied. It is found that the isomer, 5-methyl-7-hydroxy-2,3,4-triazaindolizine has better stabilizing effect. It can not only increase the surface sensitivity but also apparently increase the internal sensitivity three times. Birr stabilizer behaves similarly. It has been observed that there is a linear relationship between the distribution of latent image (i.e., ratio of surface to internal sensitivity) induced by triazaindolizines and degree of ageing of panchromatic photographic material. In other words, the smaller the ratio of surface to internal sensitivity is, the slower the change of photographic characteristics during the storage course of photographic films will be. The possible mechanism of the sensitization and stabilization is discussed.

15.
MILITARY SCIENCES

15A. Antisubmarine Warfare

AD-A095 111/1 PC **A03**/MF **A01**
SACLANT ASW Research Centre, La Spezia (Italy).
Some Models Relating to Encounters between Ships in Transit and Submarines on Patrol,
Gijsbertus E. van Domselaar. 15 Dec 80, 31p
Rept no. SACLANTCEN-SM-145

Recently in force employment studies several high level campaign models have been developed. These models mainly describe the interactions between Soviet submarines and NATO reinforcement and resupply shipping. Values of input parameters are required, which could either be determined by submodelling or simply be given. The choice highly depends on the sensitivity of the results to these input parameters and to the available information for developing submodels. This memorandum describes submodels for two input parameters to higher models: the encounter rate between transitting NATO ships and a submarine on patrol, and the average time a submarine will spend inside the convoy defences when attempting to attack a convoy. (Author)

15C. Defense

AD-A094 686/3 PC **A17**/MF **A01**
Naval Research Lab., Washington, DC.
Forecast of Remote Underwater Sensing Technology.
Final rept. May 79-Jul 80,
Vicent A. Del Grosso, and Perry B. Alers. Jul 80, 381p USCG-D-38-80
Contract MIPR-Z70099-9-94080

The main purposes of this report are: (1) The delineation of the current status of underwater remote sensing system technologies identified as having present or potential utility to current and projected U.S. Coast Guard missions; and (2) the development of 10 year and 25 year forecasts of the evolution of these technologies. A narrative discussion is presented in Chapter 4 of seven broad technological categories encompassing these systems, viz., ACOUSTIC, OPTICAL, MAGNETIC, ELECTRIC FIELD, ELECTROMAGNETIC (Miscellaneous), CHEMICAL, and FIBER OPTIC. These are further divided into 27 specific categories which are described in sufficient detail to permit familiarization with their individual promises and problems.

AD-A094 747/3 PC **A06**/MF **A01**
Center for Planning and Research, Inc., Palo Alto, CA.
Manual for Developing EOC Standard Operating Procedures,
Kent F. Paxton. Aug 80, 114p
Contract DCPA01-77-C-0231

This Emergency Operating Center (EOC) Procedure Manual is designed to provide guidelines on establishing, readying, and operating EOCs, and to serve as a model for locally developed procedure manuals or SOPs. The manual is also intended to be used as a training device for EOC staffs. EOCs and EOC staffs must be prepared to function in a wide range of operating situations. This manual reflects that requirement for EOC flexibility and adaptability, particularly in community shelter (CSP) and crisis relocation (CRP) operating modes. Some of the more common events that could require the central information-gathering and decision-making of an EOC are listed. The list does not cover all of the contingencies that might require a central control point. In addition, many of the disasters listed can be compounded by ensuing threats. Earthquakes, for instance, can cause landslides or dam failures. Blackouts can lead to civil disturbances. A train derailment can result in a hazardous materials incident. A resource boycott of the United States can escalate to conventional war and then to nuclear war. The emergency situation will determine, to a large extent, the direction and control function that the EOC will perform, and the human and material resources required to perform it. This manual reflects the differing requirements of the various disaster agents and emergency situations.

AD-A094 748/1 PC **A07**/MF **A01**
Center for Planning and Research, Inc., Palo Alto, CA.
EOC Requirements at State and Local Levels.
Final rept.,
Kent F. Paxton, Frederick Goshe, and Charles T. Rainey. Aug 80, 148p
Contract DCPA01-77-C-0231

Emergency Operating Center functions and requirements at local, area, sub-State, and State levels are analyzed. EOC roles in times of normalcy, in natural disasters with and without warning, and in the crisis, in-shelter, and postattack phases of nuclear war are examined and compared. Three approaches to a backbone nationwide direction and control network are reviewed. A sub-State system based on existing State Highway department districts is proposed and correlations with other backbone concepts evaluated. In a companion manual, a guide to developing an EOC standard operating procedure is presented, based on the foregoing EOC requirements analysis. The manual includes a sample EOC Standard Operating Procedure for a county. (Author)

AD-A094 813/3 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Trade-Off Analysis of Wavelengths for Tactical Electro-Optical Air-to-Ground Weapon Systems.
Master's thesis,
Gregory A. Mullins. Dec 80, 80p Rept no. AFIT/GEO/PH/80D-9

A trade-off analysis was conducted for Nd:YAG, CO2, and millimeter wave (90 GHz) systems to determine which has the greatest potential for the next generation, electro-optical tactical weapon system for the Air Force. State-of-the-art performance parameters were used for each of the candidate systems. Also, inherent wavelength-dependent factors were established by the selection of the Eastern European scenario as the theoretical engagement theater. By using utility theory, trade-off analysis was performed on the basis of individual system figures-of-merit. The analysis showed that, for the air-to-ground delivery of point-tracking weapons, the CO2 system has the highest utility, followed by the Nd:YAG system. The millimeter wave system exhibits very poor utility because of its large beam divergence. (Author)

AD-A094 854/7 MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
HELBASE: A Tool for the Analysis of High Energy Laser Weapon Development, Deployment, and Operation.
Master's thesis,
Jeffrey L. Dutton. Dec 80, 187p Rept no. AFIT/GOR/OS-80D-3
Availability: Microfiche copies only.

A computerized simulation model was developed as a flexible tool to aid in the design, deployment, and employment decisions regarding high energy laser weapons. Only the 'space defensive' and 'antisatellite' missions are considered. The simulation models the physical processes of laser propagation and laser effects, and it includes a 'first-order' optimization process for selection of weapons and weapon paths of maximum efficiency. It also includes a 'many-on-many' engagement model to test the effectiveness of the weapons selected. Target satellites include a set of f ur hypothetical systems representing 'real world' possibilities. Weapon choices may be base on the surface of the earth, in aircraft, or in circular orbits. The user specifies weapon design characteristics as well as associated basing modes for each type of weapon to be deployed by the optimization model. In addition to selecting the targets and defining the types of weapons to be used, the user defines the time allowed to accomplish a defined mission, and the percentage of each system of target satellites which must be negated. Rudimentary tactics for weapon employment are also allowed. Validation, verification, and experimental designs for model use are discussed. Recommendations for model expansion are given. (Author)

AD-A094 949/5 PC **A04**/MF **A01**
RAND Corp., Santa Monica, CA.
On Deterrence,
Michael B. Seaton, Phillip D. Gardner, and Richard E. Porter. Apr 80, 71p Rept no. RAND/P-6468

Contents: On Deterrence: A Broadened Perspective; Principles of Deterrence; Principles Don't Deter, Fight Battles, or Win Wars; Deterrence Theory and Deterrence Principles; Why Principles of Deterrence.

AD-A094 983/4 PC **A06**/MF **A01**
Army Command and General Staff Coll., Fort Leavenworth, KS.
Defense of North America during a NATO-Warsaw Pact Conflict: Some Implications of the USSR's Power Projection Capabilities.
Master's thesis,
Joseph J. Trinca. 6 Jun 80, 122p AD-E750 063

This study attempts to determine whether or not the existing conventional military forces and defense systems in North America are adequate both to meet commitments to NATO in the event of a major European conflict and provide for continental security. Investigation reveals that Canada is weakly defended relative to the capabilities of the USSR to project forces onto her territory. Thus, should the USSR choose to exploit this vulnerabil-

ity by executing rear area military operations on the North American flank at the outset of a NATO-Warsaw Pact conflict, she could succeed in diverting crucial U.S. and Canadian reinforcements away from their primary missions on the battlefields of Europe. (author)

15E. Logistics

AD-A094 850/5 PC **A03**/MF **A01**
North Carolina Univ. at Chapel Hill. School of Business Administration.
(s,S) Policies for a Dynamic Inventory Model with Stochastic Lead Times.
Technical rept.,
Richard Ehrhardt. Dec 80, 29p Rept no. TR-17
Contract N00014-78-C-0467

A stochastic lead time inventory model is analyzed under the assumptions that (1) replenishment orders do not cross in time and (2) the lead time distribution for a given order is independent of the number and sizes of outstanding orders. This study corrects errors in the existing literature on the finite-horizon version of the model and yields an intuitively appealing dynamic program that is nearly identical to one that would apply in a transformed model with all lead times fixed at zero. Hence, many results that have been derived for fixed lead time models generalized easily. Conditions for the optimality of (s,S) policies are established for both finite and infinite planning horizons. The infinite-horizon model analysis is extended by adapting the fixed lead time results for the efficient computation of optimal and approximately optimal (s,S) policies. (Author)

AD-A094 851/3 PC **A05**/MF **A01**
North Carolina Univ. at Chapel Hill. School of Business Administration.
An Empirical Comparison of Two Approximately Optimal (s,S) Inventory Policies.
Technical rept.,
Richard Ehrhardt, and George Kastner. Dec 80, 83p Rept no. TR-16
Contract N00014-78-C-0467

In this paper, we present an empirical comparison of two approximately optimal rules for computing (s,S) policies for single items under periodic review with a setup cost, linear holding and storage costs, fixed replenishment lead time, and backlogging of unfilled demand. The Naddor Approximation, originally designed for holding and shortage costs based on period-average inventory levels, is transformed for use in a system where these costs are based on period-end inventory. It is compared empirically with the Power Approximation and with exactly optimal policies in a system of independent inventory items having 576 distinct parameter settings. The Power Approximation yields lower expected total costs than the Naddor Approximation in 456 of the 576 cases. The cost differences tend to be rather small, however. When total costs are aggregated over the entire system, the Power Approximation is 1.65% above optimal, as compared with 2.34% for the Naddor Approximation. Significant differences appear only when components of total cost are examined. The robustness of the policies is examined by analyzing their performance when statistical estimates are used in place of the actual mean and variance of demand. We also discuss the sensitivity to parameter settings of the performance of the two rules. (Author)

AD-A094 853/9 PC **A03**/MF **A01**
California Univ., Los Angeles. Western Management Science Inst.
Real-Time Dispatch of Petroleum Tank Trucks. Revision.
Working paper,
Gerald G. Brown, and Glenn W. Graves. 12 Aug 80, 33p Rept no. WMSI-WP-306
Contract N00014-75-C-0570
Revision of report dated Dec 79, AD-A081 610.

A highly automated, real-time dispatch system is described which uses embedded optimization routines to replace extensive manual operations and to reduce substantially operating costs for a nation-wide fleet of petroleum tank trucks. The system is currently used in daily operations by the Order Entry and Dispatch segment of the Chevron U.S.A. Marketing System. Refined petroleum products valued at several billion dollars per year are dispatched from more than 80 bulk terminals on a fleet exceeding 300 vehicles in approximately 2600 loads per day. Centralized use of the dispatch system required its design and implementation as a set of transaction modules within a large management information system. This environment presents special challenges for the optimization methods; an heuristic sequential network assignment was developed for certified performance on these dispatch models in lieu of their solution as integer programs. Objectives include minimizing transportation costs (approaching $100 million annually) while maintaining equitable man and equipment workload distribution, safety standards, and customer service, and satisfying equipment compatibility restrictions. (Author)

AD-A095 054/3 PC **A02**/MF **A01**
RAND Corp., Santa Monica, CA.
Defense Expansion Capability: Testimony before the U.S. Senate Committee on the Budget, March 3, 1980,
Geneese G. Baumbusch. May 80, 12p Rept no. RAND/P-6402

There are some steps defense buyers can take now to help them cope better with current conditions in the marketplace. In addition, DoD could improve its future prospects by developing an analytical capability to provide policymakers with a better understanding of defense industrial activity. Some changes may be institutionally difficult since they will require varying from established practice. But change is essential to increase industrial responsiveness and overall efficiency in defense procurement.

AD-A095 113/7 PC **A07**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Computationally Efficient Heuristic for a Two-Echelon, Two-Indenture Inventory Model.
Master's thesis,
William H. Hughes, Jr. Dec 80, 128p Rept no. AFIT/GOR/OS/80D-4

This project addresses the computational difficulties of MOD-METRIC, a two-echelon, two-indenture recoverable item inventory model which is used by the Air Force Logistics Command (AFLC). As background, the theoretical development and current solution technique of MOD-METRIC are presented. After identifying the major causes of the computational difficulties, a different approach to solving the MOD-METRIC problem, based on recent work by Kotkin and Muckstadt, is presented. The final form of the efficient heuristic proposed in this project incorporates a new estimation procedure for the important parameters of this heuristic, and also includes an expanded search over those parameters. The results of comparing heuristic solutions with solutions obtained using the current MOD-METRIC system indicate that the heuristic provides solutions that are very close to optimal at a greatly reduced computational cost for a variety of MOD-METRIC problems. An additional benefit of the heuristic is that it generates many more solutions in a single computer run than does the current system. It is recommended that users of the current MOD-METRIC system use the implemented heuristic, after gaining confidence in its accuracy. Additionally, it is hoped that this efficient heuristic will provide an incentive for AFLC to incorporate a two-indenture model into the AFLC recoverable item inventory management system. (Author)

AD-A095 119/4 PC **A10**/MF **A01**
Naval Postgraduate School, Monterey, CA.
A Q-GERT Approach to a Requisition Processing Simulation at Naval Supply Center San Diego.
Master's thesis,
Bruce R. Faurie. Sep 80, 215p

A model is developed to simulate various aspects of Naval Supply Center requisition processing. The model is based on the Q-GERT simulation language. Q-GERT was selected because of the likelihood that existing stock point personnel could be easily trained to model stock point requisition throughput with a language that is coded directly from a visual display of the processes being simulated. This thesis introduces the basic Q-GERT concepts and develops the necessary symbology to model the NSC San Diego NSN requisition throughput procedures. (Author)

AD-A095 174/9 PC **A03**/MF **A01**
Navy Fleet Material Support Office, Mechanicsburg, PA. Operations Analysis Div.
Computation of AFS Requisitioning Objective for FILL ADDs,
David W. Thompson. 31 Dec 80, 38p Rept no. 141

An AFS supplements the FILL (Fleet Issue Load LIST) quantity for established FILL items by calculating POS (Peacetime Operating Stock) levels which are based on historical resupply demand on the AFS. For new FILL items (FILL ADDs), however, the AFS has no recorded historical resupply demand and thus, no basis for computing POS levels. POS levels for the FILL ADDs can not be built by the AFS until after the new items are placed in the FILL and the AFS begins receiving resupply demand from the deployed Fleet for these items. The inability to immediately compute POS levels for the FILL ADDs could reduce Fleet support until the AFS receives sufficient demand to build POS levels and until the AFS receives this additional material. SPCC (Navy Ships Parts Control Center) maintains historical Fleet resupply demands and thus could build demand-based levels for the FILL ADDs. This study evaluated the impact of providing an AFS RO (Requisitioning Objective) quantity in addition to the FILL quantity for FILL ADDs. Evaluation measures included AFS effectiveness, workload, dollar value of on-hand excess to the requisitioning objective, and on-hand inventory investment. The study showed that providing an Atlantic AFS RO quantity for FILL ADDs resulted in an additional 600 requisitions and 8,000 units satisfied over a six month deployment. However, this equated to less than one percentage point increase in effectiveness while excess on-hand dollar value increased significantly (38-62%). For the Pacific, providing the RO quantity for FILL ADDs had a negligible impact. (Author)

15G. Operations, Strategy, and Tactics

AD-A094 669/9 MF **A01**
Department of the Air Force, Washington, DC.
Forecasting in Military Affairs. A Soviet View,
Yu. V. Chuyev, and Yu. B. Mikhaylov. 1975, 239p Trans. from Military Publishing House of the Ministry of Defense (USSR).
Availability: Superintendent of documents, GPO, Washington, DC 20402 HC$5.50 GPO Stock no. 008-070-00456-9. Microfiche furnished to DTIC (and NTIS) users.

The book provides a rather broad review on an international scale of recent thinking on the subject of scientific planning, forecasting, and decision-making as it relates to the military. The scientific approach to these matters is observed to be highly essential in an age in which scientific and technical development gives rise to rapid changes in weapons and techniques. The results of the use of nuclear weapons are likely to be such as to deny decisionmakers the luxury approach to their task. Scientific forecasting is proposed as a means of ensuring the rapid production of soundly based information on which to make proper decisions in military affairs. It is not put forth as a substitute for the thinking of talented and experienced military experts but as a means for them to achieve their decisions in a more timely and scientific manner. The authors employ a mathematical-statistical approach in arriving at their hypotehtical forecasts, and, particulary because of the numerous examples of forecasting situations to which these techniques are applied, those involved or interested in the activity should be able to confirm their understanding of the methods of arrival at the various conclusions.

AD-A094 677/2 PC **A05**/MF **A01**
Army Mobility Equipment Research and Development Command, Fort Belvoir, VA.
Camouflage and Deception Techniques for Urban Warfare.
Final rept. 1974-1980,
Thomas T. Steck. Oct 80, 79p Rept no. MERADCOM-2310

A discussion of historical techniques and future programs dealing with camouflage in urban warfare. The report emphasizes current capabilities in camouflage and deception and concludes that camouflage and deception techniques when used properly can provide significant tactical results in urban warfare. The purpose of this report is to analyze urban warfare from a camouflage viewpoint, considering complex modes of detection and the intricate character of the urban area. The multiple methods of camouflage and deception have been compiled for use in urban warfare. The product is a guide for identifying needs for future techniques and equipment and their deployment. A task of this work was to define the urban area, recognizing its important transportation and communications systems. Research included historical analysis, statistical study of urban growth, and an inquiry into the present worldwide doctrine dealing with urban warfare. Consideration was given to strategic points of view, concentrating on those tactics deemed relevant to urban warfare; e.g., aerial reconnaissance, direct sight, and ground line communications. The report concludes that camouflage and deception can be tactically significant in urban warfare provided that effective materials are provided and that proper training is given to the using troops.

AD-A094 807/5 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Generalized Computer Model for the Targeting of Conventional Weapons to Destroy a Runway.
Master's thesis,
John Calvin Pemberton. Dec 80, 116p Rept no. AFIT/GOR/OS/80D-6

A generalized computer model for determining where to target conventional weapons against a non-reinforced concrete runway is developed. This development consists of taking the overall problem, runway destruction, and dividing it into a number of identical, stochastically independent subproblems. Then one of these subproblems is used to determine an aim point strategy which reduces the number of weapons required to achieve the level of runway destruction desired. In order to solve the subproblem, a search algorithm is developed. Along with this search algorithm, two methods for approximating the level of destruction, given an aim point strategy, are investigated. Finally, the entire model is verified and 'validated' by a number of statistical tests. Also a comparison of this model to the Airfield Assessment Program, an Air Force Armament Laboratory model, is provided. Using the model's results for the data investigated, an equation relating circular error probable and minimum launch window's width to the number of weapons employed is derived. (Author)

AD-A094 849/7 PC **A08**/MF **A01**
Army Command and General Staff Coll., Fort Leavenworth, KS.
Raiding the Continent: The Origins of British Special Service Forces.
Master's thesis,
Howard J. T. Steers. 6 Jun 80, 155p AD-E750 062

This study examines the establishment and development of British Special Service forces - the commandos and airborne forces - from June 1940 to June 1941, with particular emphasis on the relationship between the role of these forces and the overall strategic policy. The problems arising from a lack of congruence between role and policy are enumerated, as well as the effects of the circumstantial influences of prior organizational interests and individual personalities. The tendency of special units to assume a life of their own, irrespective of rational requirements, is also addressed. This study is intended to provide a historical basis, with appropriate caveats, for the contemporary decision-maker in dealing with the establishment and direction of special-purpose units. It is applicable in the current issues of the operational requirements for long range surveillance operations units and the interrelationship of counter-terrorist, Special Forces, ranger, and security assistance organizations. (author)

AD-A094 969/3 MF **A01**
National Defense Univ., Washington, DC. Research Directorate.
DRAGON ROUGE: The Rescue of Hostages in the Congo,
Fred E. Wagoner. 1980, 208p
Availability: Superintendent of Documents, GPO, Washington, DC 20402. Stock Number 008-020-00846-0, HC$4.50 Microfiche furnished to DTIC (and NTIS) users.

From a purely military standpoint the DRAGON operations were a resounding success. Military assessments were made, entailing the acceptance of considerable risk by people who would be staking their lives and reputations on the accuracy of these assessments. These judgments led to the seizing of two cities in the heart of Africa and the rescue and evacuation of over 2,000 hostages by a force of barely 600 men, with only 3 soldiers killed and 7 wounded. The decision in the DRAGON ROUGE operation to await the arrival of the armored jeeps before proceeding into the city in search of hostages was the only questionable military judgment--unfortunate, but understandable. In DRAGON NOIR the judgment was corrected. President Johnson had inherited Kennedy's crisis management team, a team that, because of the failure of bold initiative in the Bay of Pigs operation, was generally predisposed against boldness in all fields. The 11 days of the 1964 Stanleyville crisis revealed to the President his inheritance, perhaps for the first time. During his next big crisis, in April 1965 in the Dominican Republic, in another rescue operation, 'once he moved, he moved with power and decisiveness to assure the outcome.' Then there was Vietnam.

16. MISSILE TECHNOLOGY

16B. Missile Trajectories

N81-16086/3 PC **A05**/MF **A01**
European Space Agency, Paris (France).
Determination of Boundaries for Kinematic Intercept Regions and Evaluation of the Miss Distance for Line-of-Sight (LOS)-Guided Missiles.
W. Hofmann. Sep 80, 77p ESA-TT-626, DFVLR-FB-79-13
Transl. into English of "Zur Ermittlung Kinematischer Treffbereichsgrenzen U. Zur Abschaetzung der Flugkoerperablage Beim Zieldeckungskurs (Zdi)" Dfvlr, Oberpfaffenhofen, (Germany, F.R.). Rept. Dfvlr-FB 79-13, Mar. 1979. Original Report in German Previously Announced as X80-74979.

The splitting of the LOS-guidance law in a feed forward and feedback portion allows a separate consideration of the kinematic and dynamic behavior of the guidance loop. Requirements on the lead (trajectory-to-beam) - angle and the lateral acceleration of the missile can be deduced from the kinematic equations of motion. Taking into consideration a maximum value of admissible lead angle and the constraints of lateral acceleration capability the boundaries of kinematic intercept regions are presented. The performance of miss distance behavior due to missile dynamics and initial errors can be evaluated using a linearized time-varying dynamic deviation model.

16D. Missiles

AD-A094 742/4 PC **A03**/MF **A01**
Army Missile Command, Redstone Arsenal, AL. Systems Simulation and Development Directorate.
Investigation of Plume Induced Separation on a Full-Size Missile at Supersonic Velocities.
Technical rept.,
T. A. Martin. 20 Jun 80, 26p DRSMI/RD-80-12-TR, AD-E950 082

A large amount of data to determine plume effects have been obtained from various simulation techniques. To provide data for evaluating the adequacy of these simulations, a test utilizing a rocket sled to measure surface pressures on a full-size, live, high thrust rocket at Mach number up to Moo 1.6. Selected portions of the data are presented to show Mach number and thrust level effects.

AD-A095 014/7 PC **A03**/MF **A01**
Weapons Systems Research Lab., Adelaide (Australia).
Low-Speed Wind-Tunnel Tests of Two Weathercocking Sensors.
Technical memo.,
D. P. Brown, and R. I. Macleod. Aug 80, 33p Rept no. WSRL-0171-TM

Two blunt-nosed weathercocking wind direction sensors, one stabilised by a ring tail and the other by swept cruciform fins, were tested in a low-speed wind tunnel to investigate possible aerodynamic interference between these wind direction sensors and the vehicles in front of which they were to be mounted. In these low speed tests, sensor support shaft diameter and vehicle nose tip geometry both cause significant errors in the ring-tailed sensor's alignment to the free stream when the vehicle was at angle of attack. A disk baffle placed on the shaft behind the sensor base was found to reduce sensor misalignment significantly at small angles of attack. Alignment errors for the cruciform sensor were much smaller than those of the ring-tailed sensor at small angles of attack, and these smaller errors were further reduced when a baffle was placed on the shaft. (Author)

AD-A095 118/6 PC **A14**/MF **A01**
Naval Postgraduate School, Monterey, CA.
Tactical Missile Conceptual Design,
Danny Ray Redmon. Sep 80, 317p

This thesis presents the theory necessary for the conceptual design of a tactical missile. The design process begins with the well known linear aerodynamic theory for initial sizing and later includes nonlinear effects to determine the final design of the missile. Where theory does not apply, empirical methods are presented which are known to give accurate results. An air-to-air missile is designed for a specific threat as an example which immediately follows the development of the theory for each section. Several small digital computer programs are presented and used for analysis of specific areas of the design. One large program (AEROL) is used for determining the aerodynamic coefficients of the final design. (Author)

N81-15978/2 PC **A10**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Effect of Wing Location and Strakes on Stability and Control Characteristics of a Monoplanar Circular Missile with Low-Profile Tail Fins at Supersonic Speeds.
A. B. Blair, Jr. Dec 80, 200p NASA-TM-81878, L-13852

A wind tunnel test was conducted at Mach numbers from 1.70 to 2.86 to extend the aerodynamic data base for wing tail effect on stability and control characteristics of monoplanar missiles. The results are summarized to show the effects of tail fin dihedral angle, wing location, and nose body strakes. The results indicate that an increase in tail fin dihedral angle produces positive increments in directional stability that allow greater trimmed lift coefficient values (maneuver potential) to be obtained. An increase in wing tail gap for the Mach number range reduces the aerodynamic center travel and produces reductions in directional stability at the lower angles of attack. A change in wing height (vertical location) strongly influences

the angle of attack at which pitch up and the most directional stability occur. The addition of strakes to the baseline configuration increases directional stability, which allows a significant increase in stable trimmed maneuver capability. The tail fins of the baseline configuration are effective in producing roll and yaw control that are accompanied by favorable yaw and roll, respectively.

17.

NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

17A. Acoustic Detection

AD-A094 659/0 PC **A04**/MF **A01**
Naval Research Lab., Washington, DC.
Ocean Environmental Influences of Temperature and Mechanical Stress on Bare Fiber-Optic Sensors of Acoustic Pressures. Part I.
Final rept.,
Sam Hanish. 6 Jan 81, 66p Rept no. NRL-8424
See also Part 2, AD-A094 611.

A theoretical analysis is made of the signal-to-noise ratio of a fiber-optic hydrophone based on general forms of power spectra of random environmental noise. The signal is a single-frequency acoustic pressure wave. The noise is a sum of shot noise, laser jitter, environmental temperature fluctuations and environmental mechanical-stress fluctuations. Environmental effects are discussed in terms of autocorrelation functions and power spectra. Explicit formulas are derived for the case of Gaussian autocorrelations. A detailed investigation is undertaken of the effects of temperature fluctuations in the ocean on the phase stability of the signal beam. Both large-scale temperature fluctuations caused by internal waves and small-scale fluctuations caused by velocity turbulence and thermal diffusion are considered. Numerical calculations are made of specific cases of interest. It is concluded that the stability of phase is either strongly affected or moderately affected, depending on the length of the fiber exposed to the medium, the depth in the ocean, the track length of towed sensors, the time of exposure in moored sensors, and the characteristics of built-in instrumental spectral windows. (Author)

AD-A094 715/0 PC **A02**/MF **A01**
Naval Undersea Center, San Diego, CA.
A Transfer Matrix for Modularly Driven Transducer Arrays.
H. H. Ding, and J. A. Ward. Apr 71, 15p Rept no. NUC-TN-524

In the course of working with certain sonar transmitting array problems, we must determine the transfer matrix relating element heat velocities to amplifier input signals. We require this matrix to predict element head velocities as a function of a given distribution of amplifier input signals and vice-versa without resorting to scale-model or prototype array studies. The purpose of this memo is to present the development of this transfer matrix for several types of modularly-driven transducer arrays. The simplest type of modularly-driven array is that with only one element per module. The development of (K sub ij) for this type of array is presented first to prepare the way for more general developments for several types of modularly-driven arrays. We would like to emphasize at this point that the transfer matrix used in this memo may be computed utilizing data from available computer programs. No significant modification of existing programs is required; rather a new program must be written which would use several available programs in effecting final computation of the (K sub ij) transfer matrix.

AD-A094 800/0 PC **A04**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.
Cable Failures in the AN/BQS-15 Sonar System. Analysis of Failures in the Depression/Elevation Drive-Motor Power Cable and Recommendations for Their Prevention.
Final test rept. Sep 79-Feb 80,
T. L. Lewis. Jun 80, 72p Rept no. NOSC/TR-627
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

Design and fabrication deficiencies in the MIL-C-24217/3-001 connector cause failure of the AN/BQS-15 sonar system depression/elevation driver-motor power cable, resulting in damage to the motor. Failures in the 41 cables analyzed were caused primarily by mechanical and electrical breakdown and mishandling. Fabrication materials, methods, and inspections required to correct these problems are described. (Author)

AD-A094 897/6 PC **A09**/MF **A01**
Texas Univ. at Austin. Applied Research Labs.
The Performance of a Parametric Receiver in an Inhomogeneous Medium.
Technical rept.,
C. Robert Culbertson. 18 Aug 80, 185p Rept no. ARL-TR-80-44
Contracts N00024-79-C-6358, N00014-75-C-0161

This thesis describes a theoretical and experimental study of the effects of medium inhomogeneities on the performance of a parametric receiver. A review is made of the basic principles of parametric receiver operation and of wave propagation in an inhomogeneous medium. A theoretical analysis is presented for the case of a signal wave source located on the axis of the parametric receiver in a weakly inhomogeneous medium. Expressions are developed that predict the level of amplitude fluctuations in the second-order pressure at the hydrophone of the parametric receiver. Both collimated and spherically spreading pump waves are considered. The experimental study reported in this thesis was conducted in a model tank in which an array of immersion heaters and a perforated screen produced a thermal microstructure. Measurements were made of the coefficient of amplitude variation for the signal, pump, and interaction frequency waves associated with both a nearfield and a farfield parametric receiver. Results are compared to theory and discussed. (Author)

AD-A095 016/2 PC **A04**/MF **A01**
SACLANT ASW Research Centre, La Spezia (Italy).
A Resume of Deterministic Time-Varying Linear System Theory with Application to Active Sonar Signal Processing Problems,
Lewis Meier. 15 Dec 80, 54p Rept no. SACLANTCEN-SR-44

Brief summaries are given of time-varying linear system theory in both the convention frequency-shift version and the novel frequency-shift version. The latter version of the theory is utilized to obtain the matched filter output for the bistatic echo from a moving, turning line target for a linear FM pulse in a non-dispersive medium. (Author)

AD-A095 018/8 PC **A06**/MF **A01**
SACLANT ASW Research Centre, La Spezia (Italy).
Seismic Interface Waves in Coastal Waters: A Review,
Dieter Rauch. 15 Nov 80, 106p Rept no. SACLANTCEN-SR-42

The basic elements of seismic wave propagation in the upper sea floor are presented, special emphasis being devoted to the often-neglected interface phenomena (Scholte- and Stoneley waves). The most important theoretical approaches to the seismic sensing of waterborne sound are discussed briefly and a great deal of the pertinent field work since World War II is reviewed. Some guidelines are given for future research activities in this interdisciplinary field, which combines the low-frequency regime of underwater acoustics and the high-frequency regime of seismology. An extensive bioliography is provided. (Author)

AD-A095 104/6 PC **A06**/MF **A01**
Texas Univ. at Austin. Inst. for Advanced Study in Orbital Mechanics.
Estimating the Motion of a Maneuvering Targets Using Passive Measurements.
Final rept. 1 Sep 78-31 Dec 80,
B. D. Tapley, P. A. M. Abusali, and B. E. Schutz. Aug 80, 122p Rept no. IASOM-TR-80-2
Contract N00014-78-C-0663
Prepared in cooperation with Tracor, Inc., Austin, TX.

The problem of estimating the trajectory of a maneuvering target using passive measurements obtained from an array of stationary sensors is investigated. The formulation is considered in a two-dimensional rectangular coordinate system. The unknown acceleration components are modelled as Brownian motion processes and consequently the dynamic model is linear. The types of measurements used in the estimation process are the frequency and the bearing angle of some are nonlinear functions of the state vector which consists of a reference frequency and the components of position, velocity and acceleration. Computation algorithms for Extended Kalman Filter and 'batch-sequential' filter are presented. Equations for including the effects of process noise on the batch solution are derived and the computation algorithm is also given. The performance of these filters is compared using noisy measurements simulated for two different scenarios with typical target maneuvers and sensor locations. Extended Kalman Filter is found to be the best in terms of computation time and accuracy of the estimated trajectory. Sensors located as far apart as feasible yield better results than those which are closer to each other. (Author)

AD-A095 112/9 PC **A03**/MF **A01**
SACLANT ASW Research Centre, La Spezia (Italy).
Onboard Acoustic Data-Processing for the Statistical Analysis of Array Beam-Noise,
Ronald A. Wagstaff. 15 Dec 80, 46p Rept no. SACLANTCEN-SM-144

A software package for onboard acoustic data-processing in the statistical analysis of array beam noise has been implemented on a mini-computer system. The package produces products both to assess data quality and to measure the noise-field's statistical characteristics. Many of the products are sufficiently general to have application to other types of data or to satisfy other objectives. The various outputs are described and illustrated by results from simulated measurements of the ambient noise by a towed array. The simplified run procedure is included to facilitate the use of the software package by the analyst. (Author)

17B. Communication

AD-A094 678/0 PC **A15**/MF **A01**
Kansas Univ./Center for Research, Inc., Lawrence.
A Study of Adaptive Image Compression Techniques.
Final rept. 1 Jun 78-1 Jun 79,
Robert M. Haralick, and Ronald L. Klein. Feb 80, 333p AFWAL-TR-80-1072
Contract F33615-78-C-1545

This is a final report on the investigation of adaptive bit algorithm concepts for video image compression. Adaptive bit algorithms, using differential pulse code modulation (DPCM) and the discrete cosine transformation (DCT) with root mean squared (rms) error as a performance criterion have been derived using analytical and experimental procedures. The resulting algorithms have been implemented via software programs and their performance assessed via comparisons with fixed bit assignment procedures. Results are presented in quantitative form (i.e. rms error) as well as visual quality. (Author)

AD-A094 697/0 PC **A02**/MF **A01**
City Univ. of New York. Research Foundation.
Low Rate Transmission of Video Signals Using Adaptive Delta Modulation.
Interim rept. 1 Oct-31 Dec 80,
J. Barba, M. Dressler, and Donald L. Schilling. 30 Dec 80, 5p DARPA-TR-2
Contract MDA903-80-C-0476

This report describes the mode of operation of the slow scan digital video encoder. (Author)

AD-A094 698/8 PC **A04**/MF **A01**
General Electric Co., Utica, NY. Aircraft Equipment Div.
Video Bandwidth Compression System.
Final rept. 15 Sep 78-15 Nov 79,
David Ludington. Aug 80, 70p AFWAL-80-1113
Contract F33615-78-C-1401

The objective of this program was the development of a Video Bandwidth Compression brassboard model for use by the Air Force Avionics Laboratory, Wright-Patterson Air Force Base, in evaluation of bandwidth compression techniques for use in tactical weapons and to aid in the selection of particular operational modes to be implemented in an advanced flyable model. The bandwidth compression system is partitioned into two major divisions: the encoder, which processes the input video with a compression algorithm and transmits the most significant information; and the decoder where the compressed data is reconstructed into a video image for display. (Author)

AD-A094 757/2 PC **A05**/MF **A01**
Atlantic Research Corp., Alexandria, VA.
Communications-Electronic Intrasystem Electromagnetic Interference Measurement Techniques and Instrumentation.
Final rept. 20 Jun 79-20 Jun 80,
Lester E. Polisky, and John W. Savage. Dec 80, 83p CORADCOM-79-0786-F
Contract DAAK80-79-C-0786

This report concludes the results obtained during the Communications-Electronics Intrasystem Electromagnetic Interference Measurement Techniques and Instrumentation Project. The major effort consisted of an IEMCAP feasibility study, development of a broadband measurement technique from below 14 kHz to over 100 GHz, development of a distance transfer function accurate in both the near and far field and preparation of a draft Intrasystem EMC Measurement Standard.

AD-A094 824/0 PC **A04**/MF **A01**
RAND Corp., Santa Monica, CA.
Concepts of Signal Acquisition and Processing for Use with a Passive Space Communication Array.
Interim rept.,
James C. Springett. Jul 80, 55p Rept no. RAND/N-1550-ARPA
Contract MDA903-78-C-2081, ARPA Order-3584

A passive communication satellite is attractive for relaying strategic messages between distant points under conditions where active communication satellite and other terrestrial links have been negated. This note addresses two problems associated with efficient passive communication satellite use: (1) signal acquisition and (2) correction for array near-field signal degradation. A signal transfer model is developed for the satellite array, from which various fundamental properties are derived and used to assess the magnitude of the problems. Solutions are then proposed and evaluated with respect to practical implementations.

AD-A094 844/8 PC **A02**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.
Direct-Dial Amphibious Communications. Investigations during MAFLEX 1-78 Employing Automatic Telephone Central Office AN/TTC-38, Manual Telephone Switchboard SB-3614/TT, and Multichannel Radio Equipments.
Final tech rept. Sep-Nov 78,
E. J. Reynolds. 1 Dec 80, 24p Rept no. NOSC/TR-511

This report summarizes communications and results of limited communications experiments by the Third Marine Amphibious Force during MAFLEX 1-78, from 16 September through 20 October 1978. Manual Telephone Switchboard SB-3614/TT was installed and used on USS BLUE RIDGE (LCC 19) for direct dialing to shore-based systems. The investigations focused on direct- and indirect-dial internodal communications using automatic switching (shore) assets, five-level precedence, and internodal conferencing. Efforts were directed toward enhancing ship-shore communications to support Marine Corps landing operations. (Author)

AD-A094 985/9 PC **A05**/MF **A01**
Naval Postgraduate School, Monterey, CA.
A Pulse Code Modulated Fiber Optic Link Design for Quinault Under-Water Tracking Range.
Master's thesis,
David Allen Andersen. Sep 80, 91p

An underwater fiber optics communication link has been shown to be a realistic alternative to the currently planned coaxial cable link for the shallow-water torpedo tracking range at the Naval Undersea Warfare Engineering Station at Keyport Washington. The currently planned system is reviewed and a fiber optic alternative is discussed. Several possible modulation techniques are studied and compared. Pulse code modulation was chosen, and a fiber optic link was built and tested using a microprocessor controlled signal simulator. A discussion of this link; including signal formal, optical transmission and reception is included. Fiber optic communications in general is an emerging field with new concepts and active research. Several of these concepts are discussed and their possible integration into a fiber optic shallow-water torpedo tracking range is suggested.

AD-A095 021/2 PC **A06**/MF **A01**
Harry Diamond Labs., Adelphi, MD.
Damage Characterization of Semiconductor Devices for the AN/TRC-145 EMP Study.
Technical rept.,
Bruno M. Kalab. Dec 80, 110p Rept no. HDL-TR-1915

Seventeen types of diodes and 22 types of transistors of the AN/TRC-145 radio terminal set were damage tested, and the damage characteristics of the devices are provided. Damage testing consisted of stepstressing of individual junctions of the devices with voltage square pulses of 0.1- to 10-microseconds widths, both forward and reverse biasing the junctions. The damage characteristics consist of (1) the pulse power for failure or second breakdown as a function of pulse width, and (2) the pulse voltage and device impedance at the failure threshold. The pulse power for failure data are least-square fitted to theoretical relationships between failure power and pulse width. The damage constants of the thermal failure model are then obtained. Comparisons are made between experimental device failure powers and the failure powers predicted by theoretical models. Anomalous responses of low-voltage bipolar transistors are discussed. The introductory sections of the report also contain a condensed review of the state of the practical knowledge of discrete junction device failure from voltage transients. (Author)

AD-A095 062/6 PC **A11**/MF **A01**
Haskins Labs., Inc., New Haven, CT.
Speech Research: A Report on the Status and Progress of Studies on the Nature of Speech, Instrumentation for Its Investigation, and Practical Applications.
Status rept. 1 Apr-30 Jun 80,
Alvin M. Liberman. 30 Jun 80, 248p Rept no. SR-62(1980)
Grants PHS-HD-01994, PHS-HD-1-2420
Sponsored in part by Grants PHS-RR-05596, NSF-MCS79-16177, NSF-BNS78-27331, PHS-NS13870, PHS-NS13617 and PHS-AM25814.

This report (1 April-30 June) is one of a regular series on the status and progress of studies on the nature of speech, instrumentation for its investigation, and practical applications. Manuscripts cover the following topics: The perceptual equivalence of two acoustic cues for a speech contrast is specific to phonetic perception, Duplex perception of acoustic patterns as speech and nonspeech, Evidence for phonetic processing of cues to place of articulation: Perceived manner affects perceived place, Some articulatory correlates of perceptual isochrony, Effects of utterance continuity on phonetic judgments, Laryngeal adjustments in stuttering: A glottographic observation using a modified reaction paradigm, Missing -ing in reading: Letter detection errors on word endings, Speaking rate, syllable stress, and vowel identity, Sonority and syllabicity: Acoustic correlates of perception, Influence of vocalic context on perception of the (S)-(s) distinction. (Author)

AD-A095 108/7 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Audience Diversion Due to Cable Television: An Application of Nonlinear, Nondiagonally Weighted, Generalized Least Squares,
Rolla Edward Park. Mar 80, 27p Rept no. RAND/P-6399

A model of television audience shares is estimated and applied to simulate the effect of cable TV carrying distant signals on local stations' audience shares. The model is nonlinear, with a complex error covariance matrix; transformations are used to obtain generalized least squares estimates using an ordinary nonlinear regression package. The conclusion: TV broadcasting will continue to prosper, despite increasing competition from cable. (Author)

N81-16119/2 PC **A06**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Spacecraft Transmitter Reliability.
1980, 18p NASA-CP-2159, E-662
Synopsis of Workshop, Held in Cleveland, 25-26 Sep. 1979; Sponsored by NASA and Air Force.

A workshop on spacecraft transmitter reliability was held at the NASA Lewis Research Center on September 25 and 26, 1979, to discuss present knowledge and to plan future research areas. Since formal papers were not submitted, this synopsis was derived from audio tapes of the workshop. The following subjects were covered: users' experience with space transmitters; cathodes; power supplies and interfaces; and specifications and quality assurance. A panel discussion ended the workshop.

N81-16339/6 PC **A04**/MF **A01**
Stanford Univ., CA. Dept. of Engineering-Economic Systems.
Alternative Licensing Arrangements and Spectrum Economics: The Case of Multipoint Distribution Service.
C. E. Agnew. Jan 81, 51p NASA-CR-163922, SU-31
Contract NASW-3204

At present, the Federal Communications Commission assigns radio licenses following a determination of the public interest. Whenever mutually conflicting license applications are filed, the Commission holds a comparative hearing. This assignment mechanism is criticized as cumbersome and unrealiable, and three alternatives are proposed: increasing the available spectrum, and either auctions or lotteries of radio licenses. An analysis is presented of the present system and these alternative arrangments for assigning rights to the frequency spectrum for the Multipoint Distribution Service (MDS). Although MDS is a relatively minor radio service, it serves as a prototype for message distribution services with a large potential for use in business communications. Moreover, the way in which the initial batch of MDS licenses was assigned provides a unique opportunity for empirical work on the economics of the licensing process.

N81-16340/4 PC **A04**/MF **A01**
City Coll., New York.
Bandwidth Compression of Color Video Signals.
Ph.D. Thesis Final Report, 1 Oct. 1979 - 30 Sep. 1980.
D. L. Schilling. 1980, 57p NASA-CR-163872
Grant NSG-5013

The different encoder/decoder strategies to digitally encode video using an adaptive delta modulation are described. The techniques employed are: (1) separately encoding the R, G, and B components; (2) separately encoding the I, Y, and Q components; and (3) encoding the picture in a line sequential manner.

N81-16341/2 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
On the Power Spectral Density of Quadrature Modulated Signals.
T. Y. Yan. 15 Jan 81, 34p JPL-PUB-80-95
Contract NAS7-100

The conventional (no-offset) quadriphase modulation technique suffers from the fact that hardlimiting will restore the frequency sidelobes removed by proper filtering. Thus, offset keyed quadriphase modulation techniques are often proposed for satellite communication with bandpass hardlimiting. A unified theory is developed which is capable of describing the power spectral density before and after the hardlimiting process. Using the in-phase and the quadrature phase channel with arbitrary pulse shaping, analytical results are established for generalized quadriphase modulation. In particular MSK, OPSK or the recently introduced overlapped raised cosine keying all fall into this general category. It is shown that for a linear communication channel, the power spectral density of the modulated signal remains unchanged regardless of the offset delay. Furthermore, if the in phase and the quadrature phase channel have identical pulse shapes without offset, the spectrum after bandpass hardlimiting will be identical to that of the conventional QPSK modulation. Numerical examples are given for various modulation techniques. A case of different pulse shapes in the in phase and the quadrature phase channel is also considered.

PB81-151201 PC **A07**/MF **A01**
Federal Communications Commission, Washington, DC. Office of Plans and Policy.
Policies for Regulation of Direct Broadcast Satellites.
Staff rept. (Final),
Florence O. Setzer, Bruce A. Franca, and Nina W. Cornell. Sep 80, 131p

This Staff Report examines the potential market for satellite-to-home television broadcasting and makes recommendations to the FCC concerning appropriate regulatory policies for direct broadcast satellites (DBS) for the period following the 1983 Regional Administrative Radio Conference (RARC). The report concludes that many substitutes for DBS will be available in the market for subscription video programming. Neither conventional broadcast regulation, which assumes scarcity of channels, nor common carrier regulation, which assumes monopoly power will be appropriate. The report recommends several functions the Commission should perform because of its spectrum allocation responsibilities, but recommends that the Commission make no rules concerning compatibility, signal quality, ownership of receiving equipment, program content, prices, service offerings, or control of channels. The Staff Report recommends a hybrid regulatory approach recognizing that subscription video programming services have characteristics both of broadcasting and of point-to-point services and need not be subject to conventional common carrier or broadcast regulation. The Staff Report contains appendices discussing the potential number of DBS channels available in the United States, advantages and disadvantages of block spectrum assignment plans, and a legal discussion of the appropriate regulatory classification for DBS.

PB81-153512 PC **A08**/MF **A01**
National Telecommunications and Information Administration, Boulder. CO. Inst. for Telecommunication Sciences.
VIDEOTEX Systems and Services,
L. R. Bloom, A. G. Hanson, R. F. Linfield, and D. R. Wortendyke. Oct 80, 168p NTIA/REPORT-80-50

A new, consumer-oriented family of innovative information distribution services, generally termed VIDEOTEX, is being offered to the European and Japanese public. Several field trials are underway in the United States. Normally using a modified home TV receiver as the display terminal, services provide user access to broad varieties of computerized data banks. Distribution to the user is typically via broadcast TV (one-way services) or the switched telephone network (two-way, interactive services). Also, there exists hybrid services in which the requested service may be transmitted over a different medium from the received information. This report discusses representative services and distribution system architectures, potential impact on the telephone network, the need for and status of standards, and economic considerations for user and suppliers.

PB81-155129 PC **A08**/MF **A01**
National Telecommunications and Information Administration, Boulder. CO. Inst. for Telecommunication Sciences.
The Coverages of the MF and VHF Maritime Distress Communication Systems,
William A. Kissick. Oct 80, 153p NTIA/REPORT-80-52

The radio coverage for two maritime distress communication systems are calculated for those U.S. Coast Guard stations in the contiguous United States. The two systems are: the international MF distress channel and the international VHF distress channel. The predicted coverage for each station is shown as a contour drawn on a map background.

PB81-155160 PC **A05**/MF **A01**
National Telecommunications and Information Administration, Annapolis, MD.
Spectrum Resource Assessment in the 902-928 MHz Band.
Technical rept.,
Bohdan Bulawka. Sep 80, 99p NTIA/REPORT-80-46

This report documents a spectrum resource assessment for the 902-928 MHz band. Included is information on allocations, technical standards, frequency assignments, system characteristics, and a review of applicable compatibility analyses. Three problem areas affecting U.S. Government usage of the band are identified and studied. One area deals with providing spectrum support in the 900 MHz region for a new fixed service while the other issues deal with the impact of ISM operation and restricted radiation devices on current users.

17D. Electromagnetic and Acoustic Countermeasures

AD-A094 825/7 PC **A03**/MF **A01**
Computer Sciences Corp., Falls Church, VA. Systems Div.
Electronic Warfare - Electromagnetic Threat Analysis System, (EW-ETAS).
Final technical rept. 25 Jun 76-31 May 80,
John A. Rummans, Jr. Nov 80, 32p RADC-TR-80-352
Contract F30602-76-C-0376

This effort was for the development of a system to assist FTD's analysts in their efforts to provide scientific and technical intelligence on Electronic Warfare and its threat. The system is called the Electronic Warfare - Electromagnetic Threat Analysis System (EW-ETAS). After progressing through the classic steps of systems development a subset of the full system capabilities was selected for immediate implementation as a 'prototype' to demonstrate the system's potential. The effort was changed to make prototype demonstration on leased equipment at CSC and installation of the prototype software on equipment at FTD possible. Individual subsystems were demonstrated and the prototype programs installed at FTD. The three (Intelligent Terminal, Graphics Terminal, and Desk Top Calculator) operational subsystems adequately demonstrated the soundness of the system development and design configuration. Future efforts that would implement a fully operational system will provide the FTD analyst with a highly valuable tool in the analysis of EW information for scientific and technical intelligence. (Author)

17E. Infrared and Ultraviolet Detection

AD-A094 630/1 PC **A03**/MF **A01**
Honeywell Systems and Research Center, Minneapolis, MN.
Advanced Pattern-Matching Techniques for Autonomous Acquisition.
Quarterly progress rept. no. 3, 4 Feb-23 Jul 80,
P. M. Narendra, and B. L. Westover. Oct 80, 40p
Rept no. 80SRC76
Contract DAAK70-79-C-0114

The key objective of this effort is the development of pattern-matching algorithms which can impart autonomous acquisition capability to precision-guided munitions such as Copperhead and Hellfire. Autonomous acquisition through pattern matching holds the promise of eliminating laser designation and enhancing fire power by multiple target prioritization. The pattern-matching approach being developed under this program is based on a symbolic pattern-matching framework, which is suited for the autonomous acquisition scenario. It is based on matching a symbolic representation derived from the two images, and it can accommodate the stringent pattern-matching criteria established by the scenario: enormous differences in the scene perspective, aspect and range between the two sensors, differences in sensor characteristics and illumination, and scene changes such as target motion and obscuration from one view point to the other.

AD-A094 658/2 PC **A03**/MF **A01**
Arnold Engineering Development Center, Arnold AFS, TN.
Infrared Standards to Improve Chamber 7V Beam Irradiance Calibrations.
Final rept. 1 Oct 79-30 Sep 80,
F. G. Sherrell. Jan 81, 48p Rept no. AEDC-TR-80-45
Prepared in cooperation with ARO, Inc., Tullahoma, TN.

A working standard, low-temperature, blackbody has been developed for use in establishing radiometric calibrations that are directly traceable to the National Bureau of Standards. The blackbody will be used in the process of establishing a calibration of the 7V beam irradiance, as required for LWIR sensor testing. The 7V beam irradiance calibration process is reviewed to indicate the manner in which the working standard blackbody fits into the overall calibration scheme. A complete description of the design and calibration of the working standard blackbody is presented. The device is utilized to calibrate a phosphorous-doped, silicon bolometer and the bolometer calibration procedure and results are also presented. In the overall 7V beam irradiance calibration process, the bolometer will be used to calibrate the operational sources that are utilized in 7V sensor test installations. (Author)

AD-A094 781/2 PC **A12**/MF **A01**
Missouri Univ.-Columbia. Research Reactor Facility.
Advanced Techniques for Transmutation Compensation of Extrinsic Silicon Detectors.
Final technical rept. 15 Feb 78-31 Oct 80,
J. M. Meese, D. L. Cowan, Meera Chandrasekhar, P. J. Glairon, and R. Lindley. Oct 80, 272p AFWAL-TR-80-4137
Contract F33615-78-C-5015

The effects of nuclear transmutation doping in high quality detector grade silicon have been investigated. A theoretical treatment of the concepts of critical fluence for exact compensation, extrema of silicon electrical parameters as a function of fluence, and defect production rates is presented. Theoretical models of resistivity homogeneity as a function of compensation ratio and maximum possible mean resistivity by NTD as a function of initial resistivity fluctuations are also treated. Experimental techniques such as NAA, isochronal annealing, EPR, optical absorption, Raman scattering, resistivity measurements and DLTS have been used to classify quantitatively the types of defects produced during NTD compensation. Several defect energy levels have been identified by a correlation of EPR and DLTS. The total number of atomic displacements which survive room temperature irra-

diation have been found to be only about 7% of the total displacements created during irradiation. In addition, highly disordered regions, which in many ways is similar to amorphous silicon, have been observed to anneal in the temperature range of 300-600C. (Author)

AD-A095 152/5 PC **A02**/MF **A01**
Purdue Univ., Lafayette, IN. School of Electrical Engineering.
FLIR Target Detection Algorithms.
Final rept. 1 Sep 79-31 Aug 80,
Thomas S. Huang. 30 Nov 80, 18p TR-EE80-50, ARO-16948.3-A-EL
Contract DAAG29-79-C-0200

Two important aspects of FLIR target detection and recognition have been studied. (1) Effects of noise-reduction preprocessing on further analysis and classification: It was found that median and linear averaging filters do help shape and texture feature extraction; however, they degrade rather than improve mensuration accuracy. (2) Estimation of motion of rigid bodies: Based on the relation between time and spatial differences, a fundamental equation has been derived which can be used to estimate the three-dimensional motion parameters of rigid bodies locally. (Author)

17G. Navigation and Guidance

AD-A094 745/7 PC **A03**/MF **A01**
Army Missile Command, Redstone Arsenal, AL. Research Directorate.
Optical Correlation Seeker.
Technical rept.,
Charles R. Christensen, and Richard L. Hartman. 5 May 80, 30p DRSMI/RR-80-4-TR, AD-E950 083

A new concept in seekers has been developed by integrating the sensor with an Optical Data Processor (ODP). The resulting system, in a terminal guidance submissile configuration, will recognize a tank if there is one in the field of view, discriminate between friend and foe, and provide guidance signals to home in on the target. The system will fit in a 150 mm diameter by 20 mm section, and consume less than one watt of power. The system will have retargeting and damage assessment capabilities. This new concept is the culmination of a number of years of research in optical data processing at the Missile Command, focusing on three main problems: real time data input, sensitivity to orientation or aspect, and size of the system. The first problem was solved by contractural development of a liquid crystal coherent image modulator, the second problem by the in-house invention of a multiplexed filter, and the third problem with the development of an ODP system which operates with a laser diode. This development opens the door to move ODP from the laboratory into Army application. (Author)

AD-A094 961/0 PC **A02**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Charted Port Positions in the Pacific as Defined by Satellite Determined Positions Using Multiple Observations,
Valerie M. Godley. 1980, 16p Rept no. HIG-CONTRIB-1009
Contract N00014-75-C-0209
Pub. in International Hydrographic Review, v57 p77-91 Jul 80.

No abstract available.

AD-A095 049/3 PC **A06**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Active BCAS: Design and Validation of the Surveillance Subsystem.
Project rept.,
William H. Harman, Jerry D. Welch, Raymond R. LaFrey, and M. Loren Wood. 17 Dec 80, 117p ATC-103, FAA-RD-80-134
Contract DOT-FA72-WAI-817

Lincoln Laboratory, under FAA sponsorship, is developing an Active Beacon Collision Avoidance System (BCAS), concentrating primarily on the air-to-air surveillance subsystem. The surveillance functions required are to detect the presence of nearby aircraft (whether they are equipped with ATCRBS transponders or DABS transponders), and then generate a surveillance track on each aircraft, issuing range and altitude reports once per second. The development effort consisted of airborne measurements complemented by simulation studies and analyses. The basic effects of ground-bounce multipath, interference, and power fading were assessed by air-to-air measurements. In other measurements, the BCAS interrogation and reply signal formats were transmitted between aircraft, and the results recorded for later playback and computer processing using the BCAS surveillance algorithms. This is a flexible means of experimentation which allows many of the design parameters to be changed as the effects are noted. In the most recent phase of the program, Lincoln designed and built realtime BCAS Experimental Units (BEUs), flight tested them, and then delivered them to the FAA for more extensive flight testing. In one of these flight tests, a BEU-equipped Boeing 727 flew to New York, Atlanta, and other major terminal areas in the eastern U.S. An analysis of BEU performance during this 'Eastern Tour' is given in this report. (Author)

AD-A095 076/6 PC **A02**/MF **A01**
Federal Aviation Administration Technical Center, Atlantic City, NJ.
Math Model Study, Runway 16R Instrument Landing System Localizer at Seattle-Tacoma Airport, Washington.
Data rept. for period ending Aug 80,
Jesse D. Jones. Jan 81, 25p Rept no. FAA-CT-80-61

Results of a math model study for the runway 16R instrument landing system (ILS) localizer at the Seattle-Tacoma Airport, Washington, are presented. This study was performed at the request of the Northwest Region of the Federal Aviation Administration (FAA) to determine the effects to the course structure of a proposed building and the replacement of the existing ILS localizer system. Resultant course structure plots are presented for both the existing Texas Instruments Basic Parabolic Category II Localizer and the proposed Wilcox 14/6 Category III Localizer, with and without the effects of the proposed Boeing building. The course structure plots are the output from the ILSLOC mathematical model computer program developed by the Transportation Systems Center and run on the Honeywell 66/60 computer at the FAA Technical Center. (Author)

PB81-151300 PC **A11**/MF **A01**
Gould Information Identification, Inc., Fort Worth, TX.
Loran-C RFI Measured in Los Angeles, California.
Final rept. Dec 78-Jan 79,
W. R. Vincent, and G. Sage. Oct 80, 238p DOT-TSC-UMTA-80-38, UMTA-MA-06-0041-80-1
Contract DOT-TSC-1237
Prepared in cooperation with Systems Control, Inc., Palo Alto, CA.

Radio noise and RFI at and near frequencies employed by Loran-C radio navigation systems were investigated in portions of Los Angeles, California. Emphasis was placed on the definition of the detailed time and frequency domain structure of noise and RFI which might degrade the reception of Loran-C signals in urban, suburban, and industrial areas of Los Angeles. The measurements were directed toward obtaining an understanding of the noise and RFI environment which would be encountered by vehicularly installed Loran-C navigation systems. Measurements were made at and around the 100 kHz band of frequencies employed by Loran-C, and they were made from a mobile van. The noise and RFI instrumentation is described in this report.

PB81-154387 PC **A03**/MF **A01**
National Telecommunications and Information Administration, Annapolis, MD.
Evaluation of Discrete Address Beacon System (DABS) EMC.
Technical rept.,
Robert M. Pratt, and Jay S. Levy. Nov 80, 41p NTIA-REPORT-80-53
Sponsored in part by Federal Aviation Administration, Washington, DC.

The FAA is currently developing the Discrete Address Beacon System (DABS) as an evolutionary upgrading of the Air Traffic Control Radar Beacon System (ATCRBS). Questions have been raised regarding the Electromagnetic Compatibility (EMC) of ATCRBS and DABS because of their common channel usage. The EMC of DABS with operational and firmly planned systems in the 960-1215 MHz band was investigated. This was accomplished by evaluating FAA theoretical calculation, measurement, and simulation results, and performing an independent analysis through theoretical calculations and computer simulations.

17I. Radar Detection

AD-A094 727/5 PC **A04**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Parameter Estimation Accuracy for Radar Targets Closely Spaced in Range.
Technical note,
Chaw-Bing Chang. 12 Nov 80, 52p TN-1980-46, ESD-TR-80-220
Contract F19628-80-C-0002

In this report, we discuss the amplitude, location, and the relative separation estimation accuracy of radar targets closely spaced in range using the Cramer-Rao bound. It is assumed that the phases of successive signals are coherent and therefore contain relative line-of-sight location information. It is shown that this information can substantially reduce the estimation error when compared with the case where the relative signal phase is random. (Author)

AD-A095 072/5 PC **A02**/MF **A01**
Army Engineer Waterways Experiment Station, Vicksburg, MS. Geotechnical Lab.
Dynamic Foundation Investigation for MMW Radar Facility, Roi-Namur, Kwajalein Atoll, Marshall Islands.
Final rept.,
Ronald E. Wahl, and Jose L. Llopis. Dec 80, 24p Rept no. WES/MP/GL-80-18
Contract IAO-PODSP-MIL-890-19

Surface refraction and vibratory seismic investigations were performed at the proposed location of the MMW radar facility on Roi-Namur Island, Kwajalein Atoll, Marshall Islands, for the purpose of determining Young's moduli, Poisson's ratio, and shear moduli as functions of depth for foundation materials at this site. These elastic properties are necessary for the design of foundations that require a high degree of stability under dynamic loading conditions. Foundation materials encountered at this site consist of loose coral sands and topsoil silts to a depth of 7 ft, which are underlain by medium to dense coral sands that extend to depths of at least 75 ft. Occasional coral heads and cemented lenses were also encountered in this area. Results of the investigations indicated that the shear modulus increased from about 5,000 psi near the surface to 20,000 psi at a depth of 28 ft. Young's modulus was about three times greater than the shear modulus for a given depth. Poisson's ratio averaged 0.34 from a 0- to 4.5-ft depth and 0.49 below 4.5 ft. In addition to the foundation tests, ground motion measurements were made at the MMW site in an attempt to ascertain amplitudes caused by operation of existing radar facilities in proximity to the site. The largest particle velocity measured was 0.003 ips. (Author)

AD-A095 073/3 PC **A09**/MF **A01**
Missouri Univ.-Rolla. Dept. of Electrical Engineering.
Estimation of Oceanwave Wavenumber and Propagation Direction from Limited Synthetic Aperture Radar Data.
Final rept. 1 Mar 79-31 Jan 81,
Gordon E. Carlson, Craig L. Agne, and Charles M. McEniry. Jan 81, 198p Rept no. CSR-81-1
Contract N00014-79-C-0343

A system for determining wavenumber and propagation direction for the dominant ocean wave com-

ponent from a few scans of synthetic aperture radar data is described and analyzed. The analysis uses actual synthetic aperture radar data and provides system parameter tradeoffs and statistical performance results. While reasonable estimates of wavenumber and propagation direction are achieved in some cases, the estimates are not sufficiently consistent to be satisfactory over a wide range of cases. The primary problem is one of low signal-to-noise ratio of the radar scan data. (Author)

17J. Seismic Detection

UCRL-53062 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Surface-Wave Generation by Underground Nuclear Explosions Releasing Tectonic Strain.
H. J. Patton. 3 Nov 80, 24p
Contract W-7405-ENG-48

Seismic surface-wave generation by underground nuclear explosions releasing tectonic strain is studied through a series of synthetic radiation-pattern calculations based on the earthquake-trigger model. From amplitude and phase radiation patterns for 20-s Rayleigh waves, inferences are made about effects on surface-wave magnitude, M/sub s/, and waveform character. The focus of this study is a comparison between two mechanisms of tectonic strain release: strike-slip motion on vertical faults and thrust motion on 45 exp 0 dipping faults. The results of our calculations show that Rayleigh-wave amplitudes of the dip-slip model at F values between 0.75 and 1.5 are significantly lower than amplitudes of the strike-slip model or of the explosion source alone. This effect translates into M/sub s/ values about 0.5 units lower than M/sub s/ of the explosion alone. Waveform polarity reversals occur in two of four azimuthal quadrants for the strike-slip model and in all azimuths of the dip-slip-thrust model for F values above about 3. A cursory examination of waveforms from presumed explosions in eastern Kazakhstan suggests that releases of tectonic strain are accompanying the detonation of many of these explosions. Qualitatively, the observations seem to favor the dip-slip-thrust model, which, in the case of a few explosions, must have F values above 3. (ERA citation 06:006442)

18. NUCLEAR SCIENCE AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

CONF-801037-25 PC **A02**/MF **A01**
Michigan Univ., Ann Arbor. Electron Physics Lab.
Solid-State Processes to Produce Hemispherical Components for Inertial Fusion Targets.
K. D. Wise, M. G. Robinson, and W. J. Hillegas. 1980, 12p
Contract AC08-78DP40030
American Vacuum Society conference, Detroit, MI, USA, 13 Oct 1980.

The designs proposed for next-generation targets and components for inertial fusion (IF) involve complex multilayer, multishell configurations. Solid-state process technology offers a wide assortment of fabrication techniques useful in the realization of such structures. This paper presents several such processes which are capable of producing freestanding hemishells of a variety of materials. (ERA citation 06:007081)

CONF-801232-1 PC **A02**/MF **A01**
Varian Associates, Inc., Palo Alto, CA.
200 KW Pulsed and CW Gyrotrons at 28 GHz.
H. Jory, S. Evans, J. Moran, J. Shively, and D. Stone. 1980, 4p
Contract W-7405-ENG-26
International electron devices meeting, Washington, DC, USA, 8 Dec 1980.

Pulsed and CW gyrotron oscillators have been designed and constructed for use in electron cyclotron resonance heating in plasma fusion experiments. The tubes are designed for 200 kW output at 28 GHz with beam input of 80 kV and 8 A. The pulsed design has been operated at duty factors of 5% and pulse lengths up to 40 msec. The CW design has produced output of 200 kW CW with an efficiency of 50%. It also operated with 52% efficiency at an output level of 170 kW CW. The tubes are designed for power output in the TE sub 02 circular electric mode in oversize (2.5 inch diameter) circular waveguide. Some investigations of mode purity of the output will be described. The design and operation of waveguide components such as bends and mode filters for use with the gyrotrons will be discussed. (ERA citation 06:008480)

COO-2218-198 PC **A02**/MF **A01**
Illinois Univ. at Urbana-Champaign. Fusion Studies Lab.
Ideal MHD Stable Start-Up.
R. A. Nebel, and G. H. Moses. R.W. Miley. 1980, 5p CONF-800484-9
Contract AS02-76ET52040
Reversed field pinch theory workshop, Los Alamos, NM, USA, 28 Apr 1980.

A start-up scenario which theoretically predicts ideal MHD stability for both local and global modes during the start-up and burn phases for an RFP reactor has been found. Toroidal current density must be peaked off-axis in the prereversed phase in order to maintain stability. This is consistent with experimental observation. Density and pressure are peaked off-axis in order to stabilize Suydam modes in the weakly sheared plasma interior during the burn phase. (ERA citation 06:006777)

DOE/ER-0045/4 PC **A10**/MF **A01**
Oak Ridge National Lab., TN.
Alloy Development for Irradiation Performance. Quarterly Progress Report for Period Ending September 30, 1980.
Dec 80, 216p
Contract W-7405-ENG-26

This report is organized along topical lines in parallel to a Program Plan of the same title so that activities and accomplishments may be followed readily relative to that Program Plan. Thus, the work of a given laboratory may appear throughout the report. Chapters 1, 2, 8, and 9 review activities on analysis and evaluation, test methods development, status of irradiation experiments, and corrosion testing and hydrogen permeation studies, respectively. These activities relate to each of the alloy development paths. Chapters 3, 4, 5, 6, and 7 present the ongoing work on each alloy development path. The Table of Contents is annotated for the convenience of the reader. (ERA citation 06:008483)

DOE/ER/53092-T5 PC **A03**/MF **A01**
JAYCOR, Del Mar, CA.
Numerical Modeling of the EBT-S Ion-Cyclotron Heating Experiment.
J. L. Sperling, S. Hamasaki, H. H. Klein, and N. A. Krall. 28 Jan 80, 28p
Contract AC03-80ER53092

To determine the effect of ion-cyclotron heating on EBT-S plasma parameters, a one-dimensional, time dependent neoclassical model of plasma particle and energy transport was used. For EBT-S the code was run with the following parameters: B/ sub O/ = 0.7 tesla (axial field at the midplane), B/ sub O/ = 1.4 tesla (axial field at the throat), R/sub T/ = 150 cm (major radius), a = 15 cm (minor radius at the midplane). (ERA citation 06:008463)

GA-A-16143 PC **A14**/MF **A01**
General Atomic Co., San Diego, CA.
Design Study of a New Vacuum Vessel for Doublet III.
J. M. Rawls, L. G. Davis, and P. M. Anderson. Oct 80, 317p
Contract AT03-76ET51011

The principal thrust of the project was to examine a single design in enough depth to gain confidence in the feasibility and desirability of specific design features. However, a valuable spin-off of the project was to develop information of a more generic character to aid in future studies of possibilities for Doublet III. For example, we now feel that Doublet III can be reconfigured with any of a variety of new vacuum vessels, poloidal coil sets, and auxiliary heating systems within three years of project initiation, a period that is short compared to the time scale for developing a completely new facility. In addition, this can be accomplished at a fraction of the cost required to develop a comparable facility. (ERA citation 06:008484)

KFK-2926 PC **A02**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Kernverfahrenstechnik.
Progress Report on Research and Development Activities 1979.
Feb 80, 16p
In German.
U.S. Sales Only.

A review is given about the work performed at the named institute. This work concerns the development of the separation nozzle method and the particle injection at fusion experiments and in fusion reactors, as well as experiments with molecular beams. (Atomindex citation 11:546854)

LA-tr-80-25 PC **A06**/MF **A01**
Los Alamos Scientific Lab., NM.
Max Planck Institute for Plasma Physics.
B. Rothlein, and U. Schumacher. Aug 80, 114p
Contract W-7405-ENG-36
C Max-Planck-Gesellschaft zur Foerderung der Wissenschaften berichte und mitteilungen; 1977, 4.

A historical review of the Institute and its research programs is given. (ERA citation 06:006793)

NRL-MR-4369 PC **A04**/MF **A01**
Naval Research Lab., Washington, DC.
NRL Inertial Confinement Fusion Theory Program. 1979 Annual Report, October 1978 - December 1979.
20 Nov 80, 74p
Contract AI01-77DP40042

This is the 1979 annual report of the NRL Inertial Confinement Fusion Theory Program. It covers research performed from October 1978 through December 1979. Research in each of the four current program areas is reported: laser light absorption;fluid dynamics of ablative acceleration; development of computational techniques, and Rayleigh-Taylor stabilization techniques. (ERA citation 06:006796)

NRL-MR-4397 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
Beam Requirements for Light-Ion-Driven Inertial-Confinement Fusion.
D. Mosher, D. G. Colombant, and S. A. Goldstein. 27 Nov 80, 20p
Contract AI01-77DP40042

Pulsed-power and ion-beam production and handling techniques are available to assemble a break-even ICF experiment. In this report, simple scaling laws for beam focusing, transport, bunching and packing are combined to define and acceptable range of parameters for ignition-system modules delivering low-atomic-number (less than or equal to 6) ion beams to a pellet. Techniques for increasing the deliverable beam intensity are then discussed. (ERA citation 06:006797)

ORNL/Sub-79/21453/5 PC **A03**/MF **A01**
Varian Associates, Palo Alto, CA. Palo Alto Microwave Tube Div.
60 GHz Gyrotron Development Program. Quarterly Report No. 5, July-September 1980.
J. F. Shively, T. J. Grant, A. L. Nordquist, D. S. Stone, and G. E. Wendell. 1980, 45p

Contract W-7405-ENG-26

The objective of this program is to develop a microwave oscillator capable of producing 200 kW of CW output power at 60 GHz. The use of cyclotron resonance interaction is being pursued. The design, procurement and early construction phases of this program are discussed. (ERA citation 06:008486)

ORNL/TM-7487 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
Study of Plasma Confinement in ELMO Bumpy Torus with a Heavy-Ion Beam Probe.
F. M. Bieniosek. Jan 81, 146p
Contract W-7405-ENG-26

Plasma confinement in ELMO Bumpy Torus (EBT) is generally strongly dependent on an ambipolar electric field. Spatially resolved measurements of the resulting electric space potential phi/sub sp/ have been made in a single plasma cross section by the heavy-ion beam probe. This diagnostic injects a 4-60-keV beam of (usually) Cs exp + ions into the plasma. Measurement of the energy of Cs exp 2+ secondary ions leaving the plasma gives a continuous monitor of the local space potential. In addition, the total detected Cs exp 2+ ion current is proportional to the product of the local electron density and the ionization rate, which, in turn, is a function of the electron temperature. This signal, nf(T/sub e/), is sensitive to all three electron distributions found in EBT - those of the cold surface plasma, the warm core plasma, and the hot electron ring. (ERA citation 06:008469)

ORNL/TM-7526 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Estimated Nuclear Effects in the Neutral Beam Injectors of a Large Fusion Reactor.
R. A. Lillie, R. T. Santoro, and R. G. Alsmiller, Jr. Dec 80, 46p
Contract W-7405-ENG-26

Estimates are given for the nuclear heat loads on the cryopanels, radiation damage (energy deposition rate) in ion gun insulators, and dose equivalent rates from induced activity in the components for the Engineering Test Facility (ETF) neutral beam injectors. The estimates have been obtained by scaling similar results, obtained by careful neutronics analysis for the Tokamak Fusion Test Reactor (TFTR). The approximate nature of the scaling procedure introduces considerable uncertainty in the results, but they are, hopefully, correct to within an order of magnitude and may be substantially more accurate. (ERA citation 06:008488)

ORNL/TM-7529 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Using the Tektronix Advanced Graphing II Software on the ORNL Fusion Energy Division DECsystem-10.
W. H. Gray, and K. A. Stewart. Dec 80, 22p
Contract W-7405-ENG-26

This report documents the use of the Tektronix PLOT 10 Advanced Graphing II (AG2) software as it currently exists on the Oak Ridge National Laboratory Fusion Energy Division DECsystem-10 computer. It pertains to the graphics software library called AG2TCS, which may be used to convert AG2 subroutine calls into display images on the screen of a Tektronix 4000 series storage tube terminal and/or produce display images in .TKF-formatted graphics files for subsequent postprocessing to other graphics devices. Fully described here is the method of accessing this software. It is intended that this document serve as a user's guide to accessing the AG2 software, not as a user's guide to the modification of display image composition; the latter may be found in Tektronix's own reference on this subject. (ERA citation 06:008472)

ORNL/TM-7562 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Overview of EBT Reactor Projections.
N. A. Uckan. Dec 80, 61p
Contract W-7405-ENG-26

The ELMO Bumpy Torus (EBT) concept provides a unique basis for a truly steady-state fusion reactor in a favorable geometry with a significant Q/sub engineering/ (> 10) value. The similarity of the dimensionless parameters of the present experiments, EBT-I/S and Nagoya Bumpy Torus, to a reactor-grade plasma and observed confinement characteristics indicates plausible extrapolations and projections for a reactor. Past and present reactor studies have indicated that EBTs have many attractive reactor features. There are, of course, a number of physics and technology issues yet to be resolved. Recent developments are reviewed, and their implications to reactor physics/technology/engineering issues are discussed. (ERA citation 06:008473)

PPPL-1721 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
CO Adsorption on Al-Zr at Room Temperature.
C. H. Wu, R. L. Moore, and S. A. Cohen. Oct 80, 19p
Contract AM02-76CH03073

A study of CO adsorption on room temperature Al-Zr has been done using Auger electron spectroscopy and gas pressure measurements. The atomic surface composition of clean Al-Zr surfaces prepared in UHV by Ar exp + sputtering, was measured as a function of CO pressure and exposure time. The adsorbed C and O have the same rate constants and surface concentrations for exposures less than 2 Langmuir. Above this exposure quasi-saturation occurs. The measured sticking probability of CO on Al-Zr is constant, S = 0.7 +- .3, for fractional coverage theta less than or equal to 0.5. Above this point S decreased rapidly. The effect of surface roughness on the apparent sticking coefficient has been calculated by a Monte-Carlo simulation. Reactivation of Al-Zr by heat treatment to 700 exp 0 C has also been studied. (ERA citation 06:008490)

PPPL-1722 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Surface Analysis of TFTR Vacuum Vessel Samples Subjected to the Post-Weld Heat Treatment.
R. L. Moore, S. A. Cohen, J. L. Cecchi, and H. F. Dylla. Nov 80, 15p
Contract AM02-76CH03073

To ensure the dimensional stability of the Tokamak Fusion Test Reactor (TFTR) vacuum vessel, it is necessary to perform a post-weld heat treatment (PWHT). This process consists of heating the vessel segments to approx. 450 exp 0 C for 1.5 h. The large size of the segments precludes a vacuum bake previous to installation. Effects of the PWHT on the vacuum vessel surface were studied using small samples of vessel material which were subjected to a variety of PWHT procedures, including inert gas purges and different oven designs. Changes in topography and near-surface chemistry were investigated with SEM and sputter-Auger electron spectroscopy. These samples were compared with the surface properties of non-baked UHV-quality stainless steel. The primary difference noted between the PWHT samples and the non-baked control was the thickness of the passivation oxide layer. The thickness of this mixed oxide (FeO/Cr sub 2 O sub 3 /NiO) on the control sample was less than or equal to 100 A. The thickness of the oxide layer on the heat-treated samples ranged between 230 to 350 A, depending on the method of the PWHT. The effect of hydrogen glow discharge cleaning on these thicker oxide layers, and the consequences of such heat treatment procedure relative to oxygen impurity production in fusion devices are discussed. (ERA citation 06:008491)

PPPL-1725 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Study of the Kinetics of the Interactions of Carbon Monoxide and Oxygen with Al-Zr Surface.
C. H. Wu. Nov 80, 24p
Contract AM02-76CH03073

The interaction of CO and O sub 2 with clean Al-Zr (40/60 atomic percent) surfaces have been studied with Auger electron spectroscopy. The initial sticking probability of O sub 2 on Al-Zr was measured to be S/sub 0, O sub 2 / = 0.85. The sticking probabilities of O sub 2 and CO as a function of CO and O sub 2 contamination on a Al-Zr surface have been determined. It is found, that CO adsorption is very sensitive to O sub 2 contamination. The CO contamination is not effective at blocking the surface to subsequent O sub 2 adsorption. (ERA citation 06:008492)

UCRL-84270(Rev.1) PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Heating by the Raman Instability.
K. G. Estabrook, and W. L. Kruer. 1980, 14p
CONF-800550-1(Rev.1)
Contract W-7405-ENG-48
Anomalous absorption meeting, San Francisco, CA, USA, 28 May 1980.

Computer simulations are presented of the reflection and heating due to stimulated Raman backscatter of intense laser light in large regions of underdense plasma. The heated electron distribution is found to be approximately a Maxwellian of temperature approx. (m/sub e/2)v exp 2 /sub p/, where v/sub p/ is the phase velocity of the electron plasma wave. A simple model of the reflection is presented. Raman may cause a pre-heat problem with large laser fusion reactor targets. (ERA citation 06:008495)

UCRL-84436 PC **A02**/MF **A01**
Lawrence Livermore National Lab., CA.
Status Report on the Fusion Breeder.
R. W. Moir. 12 Dec 80, 18p CONF-801210-12
Contract W-7405-ENG-48
Miami international conference on alternative energy sources, Miami Beach, FL, USA, 15 Dec 1980.

The rationale for hybrid fusion-fission reactors is the production of fissile fuel for fission reactors. A new class of reactor, the fission-suppressed hybrid promises unusually good safety features as well as the ability to support 25 light-water reactors of the same nuclear power rating, or even more high-conversion-ratio reactors such as the heavy-water type. One 4000-MW nuclear hybrid can produce 7200 kg of exp 233 U per year. To obtain good economics, injector efficiency times plasma gain (eta/sub i/Q) should be greater than 2, the wall load should be greater than 1 MW m exp -2 , and the hybrid should cost less than 6 times the cost of a light-water reactor. Introduction rates for the fission-suppressed hybrid are unusually rapid. (ERA citation 06:008496)

UCRL-85247 PC **A02**/MF **A01**
Lawrence Livermore National Lab., CA.
Microwave Ray Tracing for the Large Tandem Mirror MFTF-B.
J. W. Shearer, and D. Lappa. 10 Dec 80, 6p
CONF-800261-1
Contract W-7405-ENG-48
Topical conference on radio frequency plasma heating, Austin, TX, USA, 9 Feb 1980.

Electron cyclotron resonance heating (ECRH) is necessary for forming and sustaining the thermal barrier in the plasma fan region at each end of the large MFTF-B tandem mirror. 1600 kW of gyrotron-generated power at 28 GHz and 56 GHz is planned to meet this requirement. Cold plasma ray-tracing calculations have been started in order to maximize the antenna-to-plasma coupling efficiency during startup of the experiment. However, a hot plasma formulation is needed at later times. In the cold plasma regime, the X-wave is found to be efficiently absorbed, but the O-wave absorption is still quite inefficient for most of the rays considered thus far. (ERA citation 06:008478)

WFPS-TME-80-008 PC **A03**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA. Fusion Power Systems Dept.
Aluminum Vacuum Vessel/First Wall Concept for the CTHR.
M. E. Culbert. Sep 80, 48p
Contract AC02-77ET52043

The purpose of this investigation was to develop a design concept for a commercial tokamak hybrid reactor (CTHR) vacuum vessel/first wall system which satisfies the engineering requirements for a commercial environment. The hybrid reactor offers the unique condition that energy extraction from the first wall is not critical from the point of view of system economics. This allows the consideration of low temperature structural material for first wall

application. Therefore, the CTHR aluminum vacuum vessel/first wall design philosophy was to utilize a low temperature design, thus minimizing the severe material and thermal stress problems associated with high temperature systems. The mechanical arrangement consists of a series of internally finned aluminum tubes fabricated into 30 sections and assembled around the torus. The coolant manifolds are at the top and bottom of the torus. The vessel sector length depends on the spacing between TF coils. Each sector is mounted on a rail system that permits translation for assembly or removal. The tubes in each sector are welded to tube sheets which are in turn welded to semi-cylindrical manifolds which distribute the coolant uniformly to the tubes. (ERA citation 06:008497)

18B. Isotopes

COO-4318-3 PC **A04**/MF **A01**
Washington Univ., St. Louis, MO. Edward Mallinckrodt Inst. of Radiology.
Preparation of Gallium-68 Radiopharmaceuticals for Positron Tomography. Progress Report, November 1, 1977-October 31, 1980.
M. J. Welch. Jun 80, 54p
Contract AS02-77EV04318

Although the germanium-68 implies gallium-68 generator is probably the only source of positron-emitting radionuclides that could enable the widespread application of positron tomography, the commercially available exp 68 Ga/ exp 68 Ge generator system suffers from several major disadvantages. The most important of these is that the generator is eluted with EDTA, which forms a very strong chelate with gallium. In order to produce radiopharmaceuticals other than exp 68 Ga-EDTA, it is first necessary to break the stable EDTA complex and remove all traces of EDTA. This procedure adds several steps and a significant amount of time to procedures for preparing exp 68 Ga-radiopharmaceuticals. We have developed a new generator using a solvent extraction system which will produce exp 68 Ga-oxine (8-hydroxyquinoline), a weak chelate. Using this agent we have synthesized several exp 68 Ga-radiopharmaceuticals and tested them in vitro and in vivo. We have also carried out some preliminary studies to compare generator systems which produce exp 68 Ga in an ionic form. Attempts have been made using polarographic and chromatographic techniques, and in vivo distribution data to investigate the stability of radiogallium complexes with a series of potentially lipophilic complexing agents. (ERA citation 06:008038)

EGG-PHYS-5269 PC **A03**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Rapid Separation of Individual Lanthanide Elements from Mixed Fission Products.
J. D. Baker. Nov 80, 40p
Contract AC07-76ID01570
Thesis. Submitted to Univ. of Idaho, Moscow.

A microprocessor-controlled radiochemical separation system has been developed to separate lanthanide elements rapidly from fission products. The system is composed of two high performance liquid chromatography columns coupled in series by a stream-splitting injection valve. The first column separates the lanthanide group by extraction-chromatography using dihexyldiethylcarbamylmethyleneophoshate (DHDECMP) adsorbed on Vydac C sub 8 resin. The second column isolates the individual lanthanide elements by cation exchange using Aminex A-9 resin with alpha -hydroxyisobutyric acid (alpha -HIBA) as the eluent. With this system, the fission-product lanthanide isotope exp 158 Sm has been identified for the first time. It was produced from a spontaneously fissioning exp 252 Cf source. Twenty-seven gamma-rays have been assigned to this activity which decays with a half-life of 5.51 +- 0.09 min. The exp 158 Sm assignment is based upon the radiochemical separation of the Sm fraction from the lanthanide fission products and the observation of the growth and decay of the 45.9 min exp 158 Eu daughter from an initially pure 5 min parent. The emission probability of the 324-keV gamma ray of exp 158 Sm was also determined, from the growth and decay of the exp 158 Eu daughter, to be 10.6 +- 1.2 gamma rays per 100 decays. Several new gamma rays have been identified by half-life as belonging to the decay of exp 157 Sm. Gamma-ray energies and relative intensities for exp 157 Sm and exp 158 Sm are reported. (ERA citation 06:006341)

INFCE/DEP/WG-1/10 PC **A04**/MF **A01**
INFCE Working Group 1. Secretariat.
Topical and Working Papers on Heavy Water Accountability and Safeguards.
51p
U.S. Sales Only.

This report contains the following papers: 1) Statement of IAEA concerning safeguarding of heavy water; 2) Preliminary Canadian Comments on IAEA document on heavy water safeguards; 3) Heavy water accountability 03.10.78; 4) Heavy water accountability 05.04.79. (Atomindex citation 11:532312)

INFCE/DEP/WG-1/9 PC **A17**/MF **A01**
INFCE Working Group 1. Secretariat.
Topical and Working Papers on Heavy Water Requirements and Availability.
376p
U.S. Sales Only.

The documents included in this report are: Heavy water requirements and availability; technological infrastructure for heavy water plants; heavy water plant siting; hydrogen and methane availability; economics of heavy water production; monothermal, water fed heavy water process based on the ammonia/hydrogen isotopic exchange; production strategies to meet demand projections; hydrogen availability; deuterium sources; the independent UHDE heavy water process. (Atomindex citation 11:532311)

18C. Nuclear Explosions

AD-A095 096/4 PC **A16**/MF **A01**
General Electric Co., Santa Barbara, CA. TEMPO.
Nuclear Geoplosics Sourcebook. Volume IV. Part I. Empirical Analysis of Ground Motion from Above and Underground Explosions.
Handbook,
Jacques E. Schoutens. 1 Mar 79, 372p DNA-6501H-4-1
Contract DNA001-79-C-0081
Revision of report dated 1964, DASA-1285-4. See also Volume 4, Part 2, AD-A095 097.

This sourcebook is a compendium of nuclear and high-explosive empirical data and analysis of ground motion, cratering, and ejecta. It is a revised and greatly expanded version of the Nuclear Geoplosics Sourcebook published by DNA in 1964 (DASA 1285-IV). It is not meant to be a handbook but rather an authoritative sourcebook on explosion-produced ground-behavior phenomena. (Author)

AD-A095 097/2 PC **A20**/MF **A01**
General Electric Co., Santa Barbara, CA. TEMPO.
Nuclear Geoplosics Sourcebook. Volume IV. Part II. Empirical Analysis of Nuclear and High-Explosive Cratering and Ejecta.
Handbook,
Jacques E. Schoutens. 1 Mar 79, 464p DNA-6501H-4-2
Contract DNA001-79-C-0081
Revision of report dated 1964, DASA-1285-4. See also Volume 4, Part 1, AD-A095 096.

This sourcebook is a compendium of nuclear and high-explosive empirical data and analysis of ground motion, cratering, and ejecta. It is a revised and greatly expanded version of the Nuclear Geoplosics Sourcebook published by DNA in 1964 (DASA 1285-IV). It is not meant to be a handbook but rather an authoritative sourcebook on explosion-produced ground-behavior phenomena. (Author)

AD-A095 170/7 PC **A06**/MF **A01**
Acurex Corp./Aerotherm, Mountain View, CA. Aerospace Systems Div.
Summary Report. HYBLA GOLD Event.
Final rept. 7 Jul-1 Sep 79,
Jerry R. Stockton. 1 Nov 79, 156p ACUREX-FR-79-15-AS(6988), DNA-5107F
Contract DNA001-79-C-0404

The HYBLA GOLD experiment was designed to increase our understanding of the phenomenology of the MX in-trench environment and to improve our confidence in making predictions of this environment. The HYBLA GOLD experiment satisfied most of the original objectives. Useful data was obtained for the purpose of developing and validating instrumentation which might be required in future underground nuclear tests. In general, the instrumentation fielded to measure shock time-of-arrival, plasma static pressure versus time, and the shock front profile were successful. Although the wall ablation information obtained is somewhat difficult to interpret, it did provide sufficient data to establish upper bounds. The instrumentation systems designed to provide pipe wall expansion versus time were the least successful. The data obtained in the HYBLA GOLD experiment has already been used to develop new empirical models of the plasma flow. These models have been used in the current assessment of the survivability and vulnerability of the MX continuous buried trench concept. Specifically, a new empirical ablation model has been formulated.

18D. Nuclear Instrumentation

AERE-R-9669 PC **A04**/MF **A01**
UKAEA Atomic Energy Research Establishment, Harwell. Instrumentation and Applied Physics Div.
Nuclear Electronic Instrument Systems Using the Harwell 6000 Series.
F. D. Seymour, G. F. Snelling, and I. Hawthorn.
Jan 80, 54p
U.S. Sales Only.

This report describes some of the more recent equipment designed by the Systems Instrumentation Unit (AERE, Harwell), in the Harwell 6000 modular format. The units include: Laboratory Instruments (alpha monitors, beta-gamma detectors, spectrometers, automatic sample changer systems, automated counting laboratory systems, low power systems). Environmental Monitors (nuclear plant monitor, air monitor, sea bed monitor). Process Instruments (plutonium waste control, x-ray fluorescence monitor, process monitor, beam current monitor, effluent monitors). (Atomindex citation 11:549453)

BNL-28609 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Studies of High-Gain Microchannel Plate Photomultipliers.
K. Oba, and P. Rehak. 1980, 5p CONF-801103-29
Contract AC02-76CH00016
IEEE nuclear science symposium, Orlando, FL, USA, 5 Nov 1980.

The characteristics and performance of several kinds of high-gain micro-channel plate photomultipliers have been investigated. Special attention was directed toward (1) lifetime studies, (2) performance in the magnetic field, and (3) timing properties. Lifetime studies include separate investigations of the photocathode quantum efficiency degradation caused by ion feedback, and the deterioration of the micro-channel plate gain. The dependence of the micro-channel plate photomultiplier gain on the intensity and the direction of the magnetic field (up to 7 kGauss) is reported. (ERA citation 06:006429)

BNL-28610 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
High Gain Micro-Channel Plate Multipliers for Particle Tracking or Single Photo-Electron Counting.
K. Oba, P. Rehak, and S. D. Smith. 1980, 7p
CONF-801103-31
Contract AC02-76CH00016

IEEE nuclear science symposium, Orlando, FL, USA, 5 Nov 1980.

Micro-channel plate multipliers have been used to detect the passage of relativistic charged particles. Measurements of the detection efficiency and pulse height response versus micro-channel plate gain are presented for one, two and three micro-channel plate arrays. Values describing temporal response and transit time jitter are also given. In a separate measurement, the response of a single micro-channel plate to individual slow electrons (less than or equal to 1 keV) was studied. By using a special technique output bunches as small as three electrons may be seen for low average micro-channel plate gain. The results of attempts to improve the micro-channel plate response are also presented. (ERA citation 06:008089)

CEA-CONF-4704 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Physique Nucleaire.
'Diogene' Detector, 4 pi Drift Chamber.
J. Gosset. 1979, 13p CONF-7905123-2
In French.Saturne workshop, Roscoff, France, May 1979.
U.S. Sales Only.

'Diogene' is a detector with a solid angle near the steradian 4 pi , mainly comprising a drift chamber and capable of detecting in coincidence several tens of charged particles. Built by several laboratories (Dph-N/Saclay, CRN/Strasbourg and LPC/Clermont-Ferrand) it should be ready round about June 1980 to use the heavy ion beams of Saturne II for studying the multiple production of pions and protons in central collisions of relativistic heavy ions. (Atomindex citation 11:525980)

CEA-CONF-4734 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services des Piles.
Miniaturized W Damage Detector. Application to the Determination of Damaging Neutron Fluence in Metals.
A. Alberman, J. P. Genthon, L. Lariviere, P. Leger, and L. Salon. 1979, 16p CONF-791051-27
In French.ASTM-EURATOM symposium on reactor dosimetry, Ispra, Italy, 1 Oct 1979.
U.S. Sales Only.

Since G.A.M.I.N. graphite detector widely used so far for damage dosimetry, the 'Services des Piles de Saclay' now present a new miniaturized tungsten detector. Based upon electrical resistivity increase in W after irradiated, it may be used for direct damage rate determination in metals. Theoretic W and steel d.p.a. models as well as 'Probable Zones' model presented at the 1st ASTM-EURATOM Symposium, lead to very similar damage functions. Calibration studies in Saclay's ISIS reactor have shown saturation for high fluences and no temperature dependence up to 300 exp 0 C. Good agreement was found between measurements and theoretic response, through many W - G.A.M.I.N. irradiations in different spectra. Practical use of the W detector is presented at this Symposium in 'DOMPAC' experiment: damaging fluence measurements in a pressure vessel. (Atomindex citation 11:525948)

CEA-CONF-4761 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Service de Protection contre les Rayonnements.
Procedures and Techniques for Monitoring the Radiation Detection, Signalization and Alarm Systems in the Centralized Ambience Monitoring Systems of the Basic Nuclear Facilities of the CEN Saclay.
J. J. Andre, J. Drouet, and P. Leblanc. 1979, 30p CONF-7909146-3
In French.11. national congress on the control of ionizing radiation, Nantes, France, 18 Sep 1979.
U.S. Sales Only.

After referring to the regulations governing the 'systematic ambience monitoring' in the basic nuclear facilities, the main radiation detection, signalization and alarm devices existing at present in these facilities of the Saclay Nuclear Study Centre are described. The analysis of the operating defects of the measuring channels and detection possibilities leads to the anomalies being classified in two separate groups: the anomalies of the logical 'all or nothing' type of which all the possible origins are integrated into a so-called 'continuity' line and the evolutive anomalies of various origins corresponding to poor functioning extending possibly to a complete absence of signal. The techniques for testing the detection devices of the radiation monitoring board set up in the 'Departement de Rayonnements' at the Saclay Nuclear Study Centre are also described. (Atomindex citation 11:532119)

CEA-CONF-4762 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Service de Protection contre les Rayonnements.
Description of a Radiation Monitoring System with Centralized Data Processing, Industrial Application to the 'Departement des Rayonnements Ionisants' (DRIS-CEN/Saclay).
D. Busson, J. P. Hulot, and J. P. Perotin. 1979, 19p CONF-7909146-5
In French.11. national congress on the control of ionizing radiation, Nantes, France, 18 Sep 1979.
U.S. Sales Only.

A radiation monitoring board is described for a basic nuclear facility, the role of which is the development, processing, testing, packaging and marketing of radioelements for medical, radio-pharmaceutical and industrial use. The area being monitored covers 2080 square metres of which 980 m exp 2 of laboratories and 1100 m exp 2 of active premises. Close on 300 persons work there every day. It is therefore necessary to have a very reliable and highly sensitive radiation monitoring system to guard against any radioactive incident. This central data processing type radiation monitoring board has 120 measuring channels. It is noted that this type of equipment did not pose any problems for the health physics personnel operating it. (Atomindex citation 11:532128)

CEA-CONF-4764 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Cadarache, Saint-Paul-les-Durance (France). Service de Protection Contre les Rayonnements.
Determination of the Radioactive Gaseous Effluents Discharged by a Reactor.
C. Boudou. 1979, 11p CONF-7909146-4
In French.11. national congress on the control of ionizing radiation, Nantes, France, 18 Sep 1979.
U.S. Sales Only.

A gaseous stream measuring device is used comprising a capacity (the volume of which is optimized) crossed by the effluents to be tested. The measuring probe is a scintillation detector. This device is so designed that the response for the cubic activity figures for the various noble gases in the same, corresponding to the maximum permissible concentration of each one. (Atomindex citation 11:532125)

CEA-CONF-4861 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services d'Electronique.
Fabrication of Radiation Detectors with Hgl sub 2 Crystals Grown from a Solution.
A. Friant, J. Mellet, C. Saliou, and T. Mohammed Brahim. 1979, 20p CONF-791037-29
In French.IEEE nuclear science/nuclear power systems symposium, San Francisco, CA, USA, 17 Oct 1979.
U.S. Sales Only.

Mercuric Iodide crystals grown from a solution of molecular complexes with dimethylsulfoxide have been evaluated as gamma -ray and X-ray room temperature detectors. Compared with materials grown from the vapor phase these crystals are characterized by a larger size, a lower level of native defects, but a higher impurity level. Detector technology, X-ray and gamma -ray (up to 662 keV) detection properties and characterization measurements (T.S.C., photoconductivity, photovoltaic effect) are described. The effect of light on crystal properties is briefly discussed. (Atomindex citation 11:525976)

CERN-80-05 PC **A02**/MF **A01**
European Organization for Nuclear Research, Geneva (Switzerland).
Electronics for Proportional Drift Tubes.
G. Fremont, B. Friend, K. H. Mess, W. Schmidt-Parzefall, and J. C. Tarle. 1980, 20p
U.S. Sales Only.

An electronic system for the read-out of a large number of proportional drift tubes (16,000) has been designed. This system measures deposited charge and drift-time of the charge of a particle traversing a proportional drift tube. A second event can be accepted during the read-out of the system. Up to 40 typical events can be collected and buffered before a data transfer to a computer is necessary. (Atomindex citation 11:549398)

EFI-367(25)-79 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Detecting Electronics of Drift Chambers Hodoscope System for the "Deuteron" Setup.
M. B. Bartikyan, V. G. Volchinskii, V. I. Kukarev, S. S. Mirzoyan, and K. Sh. Oganyan. 1979, 21p
In Russian.
U.S. Sales Only.

The detecting electronics of the hodoscope system is described on the base of the drift chambers for the "Deuteron" setup. A description is given of the main output devices and of the data processing from the drift chambers used in this physical experiment. A block diagram, principal schemes of the system main blocks, time diagrams, as well as the graphs of the electronics characteristics, are given in the work. (Atomindex citation 11:549381)

GSF-S-631 PC **A06**/MF **A01**
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich (Germany, F.R.). Inst. fuer Strahlenschutz.
Experimental Studies on Energy Deposition of Fast Neutron in Phantoms.
E. Maier. Dec 79, 114p
In German.
U.S. Sales Only.

In dosimetry of fast neutrons for neutron therapy the sensitivities of ion chambers are calculated from the sensitivities determined by calibration on a gamma source by means of corrective factors. This corrective factors may be separated into theoretical and experimental terms. The most important experimental corrective factors include the corrections of saturation and attenuation. If a CO sub 2 -filled carbon ionization chamber is inadiated with fast neutrons, high recombination losses of the primary charges occur, which can be calculated and corrected. By means of experimental data, obtained by purtting on caps of different thickness, and theoretical attenuation coefficients the build-up factor of a tissue-equivalent ion chamber is determined for four neutron energies. For four neutron energies and a exp 252 Cf source the relative neutron sensitivities of a tissue-equivalent cahmber and a cas bon cahmber are given. For the relative sensitivity of the carbon chamber in a phantom up to 30% smaller values are obtained than in free air at a neutron energy of 15 MeV. By means of a detailed error calculation, the accuracy to be achieved when measuring the photon and neutron energy dose in a field of mixed radiation was investigated. The total dose of absorbed energy is shown to be subject to an error of +-3% up to +-8% depending on the share of photon energy dose. The biologically effective dose can be measured with an error of +-10%. (Atomindex citation 11:549428)

GSI-80-2 PC **A02**/MF **A01**
Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.).
Darmstadt-Heidelberg Crystal Ball.
R. S. Simon. May 80, 13p
U.S. Sales Only.

A modularized NaI detector with close to 4 pi geometry can provide unique information on the decay- gamma -radiation from highly excited nuclei. GSI Darmstadt, the Max-Planck-Institute (MPI) for Nuclear Physics and the University of Heidelberg have joined in a collaboration to realize such a detector. The detector has the shape of a spherical shell with a free inner radius of 25 cm and a thickness of 20 cm and comprises 162 individual modules of equal solid angle. This contribution explains our special choice of configuration and gives an outline of the present status of the mechanical and electronic assembly. (Atomindex citation 11:552989)

IAEA-R-1662-F PC **A04**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
In-Core gamma Dosimetry by Solid State Nuclear Track Detectors. Final Report for the Period 1 April 1976-31 October 1979.
H. A. Khan. Feb 80, 68p
U.S. Sales Only.

Results are reported of a study undertaken to develop Solid State Nuclear Track Detectors (SSNTD) for the measurement of gamma doses in the megarad region such as those existing in and around a nuclear reactor core. The changes brought about in the track etching parameters and in the ultraviolet and infrared transmittances, have been studied for possible use as gamma dose measuring indices. Effects of various parameters in the core such as neutron flux, beta particles, water, temperature, and gamma ray spectrum have been investigated and found to have only small influence on the proposed gamma dose measuring indices. (Atomindex citation 11:532149)

IEA-DT-089 PC **A03**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Dosimetric Characteristics of Methyl Polymethacrylate (PMMA) Commercially Named as Clarex, for Doses Between 10 Krad and 10 Mrad.
D. de Castro Rubio Poli. Oct 78, 49p
In Portuguese.Thesis.
U.S. Sales Only.

The possibility to use the PMMA - commercially named as Clarex - for dosimetric control of industrial radiation process, taking advantage of the charges induced by ionizing radiation on the PMMA optical properties, was studied. Although theoretically other radiation effects could be eventually correlated with the dose absorbed in the PMMA (i.e., charge of mechanical or electrical properties) the dosimetric techniques based on the ultraviolet absorption spectrum modifications, near of visible region, have the advantage of their simplicity, swiftness and precision. A study on both the factors affecting the measurement reproducibility (temperature, humidity etc.) and some posterior effects that occur in the irradiated PMMA, has been acomplished. Other possible errors sources (sample thickness variation, spectrophotometer inaccuracy etc.) are also investigated. It has been concluded that the Clarex can be used as a good precision dosimeter within the interval of approximately 10 krad to 10 Mrad by measuring the optical density changes around 315 nm, provided some care is taken during handling. (Atomindex citation 11:552943)

IEA-DT-117 PC **A04**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil). Centro de Operacao e Utilizacao do Reator de Pesquisas.
Measurement of Thermal, Epithermal and Fast Neutron Flux in the IEA-R1 Reactor by the Foil Activation Method.
M. F. Koskinas. May 79, 69p
In Portuguese.Thesis.
U.S. Sales Only.

Experimental and theoretical details of the foil activation method applied to neutrons flux measurements at the IEA-R1 reactor are presented. The thermal - and epithermal - neutron flux were determined from activation measurements of gold, cobalt and manganese foils; and for the fast neutron flux determination, aluminum, iron and nickel foils were used. The measurements of the activity induced in the metal foils were performed using a Ge-Li gamma spectrometry system. In each energy range of the reactor neutron spectrum, the agreement among the experimental flux values obtained using the three kind of materials, indicates the consistency of the theoretical approach and of the nuclear parameters selected. (Atomindex citation 11:552773)

IEA-DT-118 PC **A03**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Coincidence System for the Absolute Measurement of Radionuclides Activity Using a Liquid Scintillator.
R. Pugliesi. Jun 79, 46p
In Portuguese.Thesis.
U.S. Sales Only.

A system for the standartization of radioisotopes activity using liquid scintillator detector was developed. The system was set up at Nuclear Metrology Laboratory - L.M.N. (Nuclear Physics Division - IEA). The system performance was checked by absolute activity measurements for two radioisotopes, exp 60 Co and exp 241 Am. The activities were determined by the 4 pi (alpha , beta - gamma) coincidence method. An accuracy of the order of 99,8% was obtained. The results for exp 60 Co were compared with those obtained by 4 pi beta - gamma coincidence method using a proportional counter at L.M.N., while the results for exp 241 Am were compared with those obtained through the linear extrapolation method using the same liquid scintillator. Compared to other systems, the advantages of this one are the simplicity and the short time spent in the sample preparation, and the negligible self-absorption. (Atomindex citation 11:552982)

IEA-DT-126 PC **A03**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Neutron Dosimetry Using Thermoluminescent Material and KBr.
A. Sahyun. May 79, 38p
In Portuguese.Thesis.
U.S. Sales Only.

It is investigated the misture of natural CaF sub 2 and KBr as thermal neutron dosimeter compared to pure fluorite. Firstly, it was found that a 50 - 50 mixture in weight produces the highest TL sensitivity when irradiated with thermal neutrons. Second, it was shown experimentally that for TL reading within 30 to 40 hours after irradiation, the radioisotopes exp 42 K, exp 80 Br and exp 80 sub(m)Br contribute predominantly, while for periods longer than 4 to 5 days, exp 82 Br also contributes significantly. It is in question, the minimum detectable fluence is of the order of 10 exp 9 n/cm exp 2 . (Atomindex citation 11:552984)

IPNO-PhN-79-10 PC **A03**/MF **A01**
Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.
Electrostatic Influence in a Wire Chamber. Choice of Geometric Parameters of a Chamber.
V. Comparat, and D. Ovazza. 1979, 28p
In French.
U.S. Sales Only.

The MWPC electrostatic properties are studied: a positive ponctual charge is put near an anode wire and induced charges on all electrodes of MWPC and their variations with the position of the positive charge are determined. So the best choice for geometrical parameters of a PWPC is given. (Atomindex citation 11:525962)

IPNO-79-16 PC **A02**/MF **A01**
Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.
Study of a Total Reflection Cerenkov Counter.
J. P. Didelez. 1979, 15p
In French.
U.S. Sales Only.

A Monte Carlo program simulates the emission and collection of Cerenkov light due to P and pi (0.6 to 1.4 GeV/c) going through a rectangular parallelepiped of plexiglas. Without taking into account the knocked out electrons (delta) a good theoretical separation is obtained between P and pi . The contribution of delta electrons has been calculated separately. Experimental tests are under way using cosmic rays. (Atomindex citation 11:525967)

JAERI-M-8426 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Development of a Neutron Detector with High Detection Efficiency and High Spatial Resolution and Its Applications to Reactor Physics Experiments.
T. Tojo. Sep 79, 75p
In Japanese.
U.S. Sales Only.

For detection of thermal neutrons in multiplying systems, a scintillator mixture of ZnS(Ag), exp 6 LiF and polyethylene was prepared, and its characteristics were shown. A sintillation detector using the mixture and a long acrylic-resin light guide was developed for measuring thermal neutrons in an U-H sub 2 O subcritical assembly(JAERISA). The detector was applied in the following reactor physics measurements with JAERISA: (1) cadmium ratio, (2) infinite multiplication factor, (3) material buckling, and (4) prompt neutron lifetime by pulsed neutron method. These experiments revealed that neutrons in the assembly are successfully detected by the detector owing to its outstanding characteristics of gamma-ray insensitivity, high detection efficiency and high spatial resolution. In the process of activity measurement of a foil activation detector with a GM counter, it was shown that accurate counting loss correction are difficult by usual method, because of the appreciable resolving time dependence on counting rates. In accurate correction, a new method was introduced for precise measurement of the resolving time. (Atomindex citation 11:526030)

JAERI-M-8471 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Coloration Mechanism of the CTA Film Dosimeter.
K. Matsuda, and S. Nagai. Oct 79, 45p
In Japanese.
U.S. Sales Only.

It has been studied what species are responsible for the optical density change (delta OD) at 280 nm before and after irradiation of the CTA film dosimeter. The delta OD (280) vs. storage time after irradiation curve, when irradiated in air at room temperature, indicates that the coloration occurs not only during irradiation (in situ coloration) but also after irradiation (post coloration), the former consisting of unstable and stable components. The species responsible for the unstable component of the in situ coloration are ascribed to the CTA radicals on the basis of decay characteristics of the UV and ESR spectra. The stable component, on the other hand, is due to the radiolysis products from both CTA and triphenyl phosphate (TPP) contained in the dosimeter. The post coloration, observed in the dosimeter irradiated in air, does not occur when the dosimeter is irradiated in O sub 2 , N sub 2 , or vacuo, whereas it proceeds in additive-free CTA film irradiated in air. Therefore, the post coloration may arise from the reaction of NO sub 2 produced by irradiation of air with CTA and TPP. Evidence for this view is provided by an adsorption experiment of NO sub 2 on the CTA film dosimeter. (Atomindex citation 11:526003)

JINR-13-12211 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Multi-Channel System for Detecting the beta-Activity Distribution on a Mass Separator Collector.
V. A. Karnaukhov, V. D. Kuznetsov, L. A. Petrov, V. V. Popov, and M. I. Fominykh. 1979, 10p
In Russian.
U.S. Sales Only.

Described are block diagram and operation principle of a multichannel registrating system for the beta-activity distribution taking from a mass separator collector. The system includes 120 Geiger-Mueller counters, tape-collector, shaper of pulses from counter output, coder, interface. High spatial resolution and background suppression are provided by separation of counters on essential distance from one another (approximately 38 mm) and special construction of mass-separator reception device, permitting to separate the whole reception line of activity in sites with necessary distance between them. For this purpose the tape-collecor is winded on the rod with the diameter of 12 and the length of 900 mm with the pitch of 3 or 1.5 mm. The system spatial resolution is determined by the tape-collector winding pith (1.5 mm). The absolute efficiency of beta particle detection is 30%, the proper background of Geiger counters is 15 p/min. The minimal radiactivity, which can be measured by the system, is approximately 0.2 dec/s. (Atomindex citation 11:526040)

JINR-13-12711 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.

Wide GAP-Spark Chambers Operating in a Storage Mode.
O. E. Gorchakov, and A. V. Dem'yanov. 1979, 8p
In Russian.
U.S. Sales Only.

The operation of spark chambers with 50 mm gaps are described in the mode, which permits storage of tracks for a time up to 10 exp -3 s. This storage is accomplished by applying two high-voltage pulses successively to the chamber. The best results are obtained, When the chamber is filled with a gas mixture consisting of 94.8% neon, 5% argon and 0.2% methane. The memory curves and the dependence of the efficiency upon the angle of passage of particles are represented for a spark chamber operating in this storage mode. (Atomindex citation 11:549403)

JINR-13-12771 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Thin Plastic Scintillators.
I. G. Golutvina, L. Ya. Zhil'tsova, E. N. Matveeva, and S. L. Smirnova. 1980, 5p
In Russian.
U.S. Sales Only.

Technology of preparation of thin plastic scintillators (PS) of 0.3-1 mm thickness has been described. They are prepared by the polymerization of styrene monomer with specially selected luminescent additives (LA) in glass forms in air thermostat at 150 deg C. In polymerization between glasses PS have smooth surface from both sides and preserve hard shape characteristic to styrene polymer. Application of such scintillators does not require holders, permits to treat and polish face planes and increase light collection. 2,5 diphenyloxazol(phenyl-5-(4-biphenylil))-1,3,4 oxadiazole and 1,1,4,4-tetraphenylbutadiene-1,3, which is readily soluble in polystyrene, are recommended for thin plastic scintillators as LA. Scintillation properties of prepared PS are determined by LA class. Light yield amounts to 60-90% of stilbene monocrystal, luminescence time is 1.5-3 ns. (Atomindex citation 11:549401)

KAERI-192/RR-61/79 PC **A04**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Design of Nuclear Instrumentation System.
B. J. Koh, N. P. Hong, H. K. Shin, Y. K. Kang, and S. J. Han. 1979, 74p
In Korean.
U.S. Sales Only.

This report describes the design basis and experimental results about the source range instrumentation system, such as preamplifier, pulse amplifier, test calibrate module, pulse shaper and driver and log pulse integrator and level amplifier etc., which is a part of Nuclear Instrumentation System (NIS) through their design and experiments. (Atomindex citation 11:549425)

KAERI-206/RR-75/79 PC **A05**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Design and Fabrication of Self-Powered In-Core Neutron Flux Monitor Assembly.
M. K. Chung, S. W. Cho, K. K. Cho, B. S. Cho, and S. S. Kang. 1979, 87p
In Korean.
U.S. Sales Only.

To fabricate prototypes of self-powered neutron flux detector assembly for CANDU reactors, preliminary works as mentioned below have been done for past 6 months and the results are described in this report. After survey of technical feasibilities by visiting at AECL, technology transfer on the fabrication of the detector assembly from AECL to KAERI came to agreement. All the drawings and technical specifications sent to us by AECL along the agreement were carefully studied and drawings were redrawn for actual machining and assembling works at KAERI. Technical specifications were also rewritten to meet with the local codes and standards. The target model of the detector assembly is the Wolsung CANDU-VFD-2 (Vertical Flux Detector Assembly No. 2) which accommodate 6 platinum neutron detectors adn 4 vanadium neutron detectors. This VFD-2 channel serves for both control and regulation of reactor and consists of 153 parts. Already some of the parts are under machining. (Atomindex citation 11:549391)

KFK-2848 PC **A06**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Abt. Strahlenschutz und Sicherheit.
Model Theory, the Experimental Verification, and the Dosimetric Application of Thermally Stimulated Exoelectron Emission.
Diss,
H. R. Doerfel. Sep 79, 121p
In German.
U.S. Sales Only.

On the basis of a general qualitative consideration of the solid state surface potentials a new model theory for thermally stimulated exoelectron emission (TSEE) is developed. The model theory explains most of the properties of radiation induced TSEE, which cannot be interpreted by older theories. These are for instance the decrease of exoelectron energy with increasing stimulation temperature and the existence of TSEE active electron traps having a negative electron affinity. Moreover, the theory gives as a result some new characteristic TSEE-properties, which are verified experimentally. Thus for instance the existence of an energy threshold for trap occupation and the selflimitation of trap occupation at low excitation energies are pointed out. In particular it follows from this theory that radiation induced TSEE is a real surface effect. Some special dosimetric applications following from this theory are investigated experimentally using BeO-and LiF-samples. The main point of these investigations is the development of a semi empirical model to estimate the absorbed dose in the surface layer of TSEE dosimeters. On the basis of this dosimetric model the effective mass energy absorption coefficient of TSEE sandwich dosimeters can be calculated for any combination of dosimeter material and covering material. Moreover, the dosimetric model is yielding a method to compensate the dependence of the dosimeter reading on the direction of radiation incidence. Thus TSEE sandwich dosimeters can be applied for the material equivalent dose determination in unknown radiation fields. (Atomindex citation 11:525968)

LA-UR-80-2523 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
New Developments in Radiation Protection Instrumentation Via Active Electronic Methods.
C. J. Umbarger. 1981, 20p CONF-810103-1
Contract W-7405-ENG-36
Measurement science conference, Anaheim, CA, USA, 30 Jan 1981.

New developments in electronics and radiation detectors are improving on real-time data acquisition of radiation exposure and contamination conditions. Recent developments in low power circuit designs, hybrid and integrated circuits, and microcomputers have all contributed to smaller and lighter radiation detection instruments that are, at the same time, more sensitive and provide more information (e.g., radioisotope identification) than previous devices New developments in radiation detectors, such as cadmium telluride, gas scintillation proportional counters, and imaging counters (both charged particle and photon) promise higher sensitivities and expanded uses over present instruments. These developments are being applied in such areas as health physics, waste management, environmental monitoring, in vivo measurements, and nuclear safeguards. (ERA citation 06:008091)

LAL-RT-79-4 PC **A02**/MF **A01**
Paris-11 Univ., Orsay (France). Lab. de l'Accelerateur Lineaire.
Linear Read out Electronics Associated with MWPC Cathode Strips.
A. Hrisoho, and K. Truong. Oct 79, 4p CONF-791037-30
IEEE nuclear science/nuclear power systems symposium, San Francisco, CA, USA, 17 Oct 1979.
U.S. Sales Only.

Low-cost linear chain for MWPC cathode strip charge read-out is described. Some simple relations for noise calculation of the preamplifier (which is a fast low-noise current amplifier) are given. Due to space restriction on the detector, hybrid technique for the preamplifier realization is adopted. The problem of transmission of linear signals (60 m) using twisted pairs, are discussed. 0.2% of cross-talk is achieved. Fast differential input line receiver with shortening filter is used in order to compensate the integration of the transmission line. The cross-talk and the noise pick-up are reduced by assuming a good symmetry and using charge sensing ADC for digitalization of the analog signal. (Atomindex citation 11:525985)

LPCC-T-78-01 PC **A06**/MF **A01**
Caen Univ. (France). Lab. de Physique Corpusculaire.
Setting Up of a Ge-Li Chain of High Resolution gamma Spectrometry Between 100KeV and 2MeV. Automatic Data Processing Realization by an One-Line Computer. Application to the Identification and Measurement of Very Low Activities of Artificial Radioelements in Low Normandy Coastal Sediments.
These (3e Cycle),
F. Damoy. 1979, 112p
In French.
U.S. Sales Only.

In order to perform gamma spectrometry determinations of high resolution, between 100 keV and 2.5 MeV, a device fitted with a Ge-Li diode is employed. Programs providing automatic processing of the data with a DPP 11/40 on-line computer are carried out and the effect of the significant experimental parameters is studied. This measurement method is applied by identifying and determining the absolute activity of artificial, gamma emitting, radioelements that are present in very small quantities (a few tens of Pci/kg) in various marine sediments of the Basse Normandie coasts. (Atomindex citation 11:525963)

NIIAR-4(363) PC **A02**/MF **A01**
Nauchno-Issledovatel'skii Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR).
Technique for Low Activity Measurement.
O. I. Ivanov, E. V. Krajnov, A. F. Sviridov, and V. I. Shipilov. 1979, 10p
In Russian.
U.S. Sales Only.

Installation for activity measurement on the base of Ge(Li) - detector is used to control of environmental contamination near the nuclear center. Considered is technique of low activity measurement, based on the notion of detection limit. Given are dependencies of these limits on gamma-radiation energy, measurement time, background radiation level (with plumbum protector of the detector and without it), registration efficiency for different radioactive samples including aqueous solutions in a standard flask. The calculated maximum obtained activity for samples of small geometric sizes on the detector cover during 24 hours comprises 0.02xrr.s.p/c for the energy within the range of 400-600 KeV. (Atomindex citation 11:525987)

NRPB-IE-16 PC **A03**/MF **A01**
National Radiological Protection Board, Harwell (England).
Nuclear Enterprises Portable Dose Rate Meter Type PDR4 and External Probes Types BP1/1, BP8 and GP9. Intrument Evaluation No. 16.
P. H. Burgess, and W. J. Iles. Aug 79, 30p
U.S. Sales Only.

The performance characteristics of Nuclear Enterprises Portable Dose Rate Meter Type PDR4 are evaluated under the headings: general description, facilities and controls, radiation characteristics, electrical characteristics, environmental characteristics, mechanical characteristics, the manual, summary of performance, and conclusions. Results of an investigation of the radiation characteristics of the external probes Type BP1/1, Type BP8, and Type GP9 are also detailed. (Atomindex citation 11:525959)

NRPB-IE-17 PC **A02**/MF **A01**
National Radiological Protection Board, Harwell (England).
Wallac Automatic Alarm Dosimeter Type RAD21.
P. H. Burgess, and W. J. Iles. Feb 80, 13p
U.S. Sales Only.

The Automatic Alarm Dosimeter type RAD 21 is a batterypowered personal dosemeter and exposure rate alarm monitor, designed to be worn on the

body, covering an exposure range from 0.1 to 999.9 mR and has an audible alarm which can be pre-set over the range 1 mR h exp -1 to 250 mR h exp -1 . The instrument is designed to measure x- and gamma radiation over the energy range 50 keV to 3 MeV. The facilities and controls, the radiation, electrical, environmental and mechanical characteristics, and the manual, have been evaluated. (Atomindex citation 11:549389)

PB81-857948 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Spark Chambers. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Dec 80, 165p NERACIAANT2390

Reports relating to research, studies, and applications of spark chambers in spectrometers, streamer chambers, optical telescopes, biomedical engineering, electronics, and physics are cited in this bibliography. Topics include wide gap spark chambers, high resolution cryogenic spark chambers and spark chambers for high magnetic fields. (Contains 171 citations, fully indexed and including a table of contents.)

TLU-71-79 PC **A03**/MF **A01**
Tandem Accelerator Lab., Uppsala (Sweden).
Pulse Height Defects in Surface Barrier Detectors for alpha Particles and Protons.
C. Robinson. 1979, 40p
In Swedish.
U.S. Sales Only.

An experimental investigation is reported of differences in pulse height from silicon surface barrier detectors for protons, deutrons and alpha particles. Significant differences not dependent on reaction geometries or other experimental conditions were found. A discussion of the possible causes is given. One probable cause is K-ionization in Silicon with subsequent escape of the corresponding X-ray, since the cross section for K-ionization are different for different heavy particles. (Atomindex citation 11:526019)

18E. Nuclear Power Plants

AECB-1105 PC **A02**/MF **A01**
Atomic Energy Control Board, Ottawa (Ontario).
Regulation of Nuclear Power Stations in Canada.
J. H. Jennekens. 1977, 8p
U.S. Sales Only.

The Canadian approach to licensing nuclear power stations is outlined. The Atomic Energy Control Board is responsible for the licensing process, which has three stages: site approval, the granting of a construction license, and the issuing of the operating licence. At each stage the Board must be satisfied that all safety criteria are met. Individual shift supervisors and control room operators are licensed by the Board. Canadian safety philosophy is based on design in depth. Provision of three independent channels of protection within the safety system, two independent shutdown systems, and two physically separate groups of control circuitry make CANDU-based power statons intrinsically safe. The responsibility for proving a station's safety rests with its owners. (Atomindex citation 11:532317)

AECL-6548 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Sheridan Park (Ontario). Power Projects.
Seismic Qualification of Safety-Related Instrumentation Cabinets for Nuclear Generating Stations. An Economical Approach.
R. G. Sauve, R. P. Bell, and J. M. Cuttler. Jun 79, 14p
U.S. Sales Only.

The problem of seismically qualifying different electrical instruments mounted in cabinets of a standard design is discussed and the following economical approach is described in detail. An analytical model of the cabinet structure is developed and validated by comparison with the results of shake table tests on a prototype cabinet. Modal analysis is then used to calculate the input spectra for shake table tests to qualify the individual instruments that are mounted at the required elevations in the cabinet. The worst input spectrum, appropriate to qualify each instrument, is then specified to the suppliers. This approach avoids the need to test each cabinet configuration in an assembled state in order to qualify it. (Atomindex citation 11:552826)

CEA-CONF-4774 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services d'Electronique.
Hybrid Simulation of a 900 MWe Nuclear Plant.
T. Constantieux, and M. Deat. 1979, 12p CONF-7909147-2
IMACS congress 1979: simulation of systems, Sorrento, Italy, 24 Sep 1979.
U.S. Sales Only.

To analyse the effects on PWRs of transients originating from the network, specific means of calculation must be elaborated. One of them which was conceived and set up on a hybrid computer by FRAMATOME and the FRENCH ATOMIC ENERGY COMMISSION, is described in this paper. The method chosen to validate this code is fairly original, since it consisted in carrying out a long duration test on a plan and in simulating this on the hybrid computer; then in carefully comparing the recorded data of the test with the results of the simulation. The quality of the results, thus obtained shows that a relatively unsophisticated model is able to give a good idea of actual process behavior, but only if the types of transients to be studied with the code are well identified before its elaboration. (Atomindex citation 11:532013)

CEA-CONF-5080 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Div. d'Etude et de Developpement des Reacteurs.
Methods for the Seismic Effect Analysis on the Nuclear Power Station Structures.
F. Jeanpierre, and M. Livolant. 1980, 40p CONF-800147-1
In French.Linear and non-linear calculation of piping systems, Paris, France, 21 Jan 1980.
U.S. Sales Only.

Seismic activity in France is far from being as great as in other parts of the globe, for instance Japan, California and Peru, in particular, and very few people are shocked at the idea of having to suffer from an earthquake, although periodically, such as at Arette, Oleron, etc., events do occur to remind one that seismic tremors of significant intensity can happen. In the case of nuclear reactors and given the serious secondary effects that uncontrolled destructions could involve, particularly the bursting of containment vessels or the non operation of safety systems such as the automatic drop of rods to halt the chain reaction, the earthquake hazard must be taken into account, in terms of the location of the power station, and the effects of the seism carefully estimated. The purpose of this report is briefly to describe the methods used to this end. (Atomindex citation 11:546759)

CEA-CONF-5081 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Div. d'Etude et de Developpement des Reacteurs.
Calculation of Pipes with Several Anchorage Points Subjected to Seismic Tremors.
M. Livolant, and F. Jeanpierre. 1980, 31p CONF-800147-2
In French.Linear and non-linear calculation of piping systems, Paris, France, 21 Jan 1980.
U.S. Sales Only.

The seismic analysis of structures secured to buildings, light or flexible enough not to modify the movement of the building itself, is generally carried out by the floor spectrum method. This method is analogous to that of the oscillator spectra used for structures resting on the ground, the ground movement being replaced by that of the securing point on the building. The use of such a method gives rise to problems in the analysis of structures secured at several points undergoing different movements; this is generally so for pipes. The purpose of this report is to describe and discuss the general methods, exact or step by step, which apply in this case. (Atomindex citation 11:546764)

INFCE/DEP/WG-1/3 PC **A02**/MF **A01**
INFCE Working Group 1. Secretariat.
Objectives, Scope and Programme of Work.
1p
U.S. Sales Only.

The objectives and scope for Working Group 1 were: (1) to estimate needs for nuclear energy and correlated needs for uranium and heavy water according to different fuel cycle strategies; (2) to review uranium availability; (3) to review heavy water availability; (4) to review thorium availability; (5) to consider special needs of developing countries. Sub-Groups were formed to carry out specific parts of the evaluation as follows: Sub-Group A: Nuclear Growth and Demand. Sub-Group B: Nuclear Fuel Resources. Sub-Group C: Technical and Political Aspects of Uranium and Thorium Exploration and Production. Sub-Group D: Heavy Water Availability. (Atomindex citation 11:532307)

INFCE/DEP/WG-1/5 PC **A12**/MF **A01**
INFCE Working Group 1. Secretariat.
Responses to Request for Data Related to Nuclear Power Growth Projections in IAEA Member States.
251p
U.S. Sales Only.

This paper consists of answers to questions on nuclear power growth within 48 IAEA member states. (Atomindex citation 11:532291)

KAERI-196/RR-65/79 PC **A05**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Development of Maintenance and Trouble Shooting for Nuclear Instrumentation System.
B. J. Koh, Y. H. Choi, J. S. Jeon, N. K. Kim, and J. M. Choi. 1979, 91p
In Korean.
U.S. Sales Only.

To increase the safeguards and availability factor of nuclear power plants, periodic preventive maintenance procedures, inspections and adjustments, for all assemblies of the Nuclear Instrumentation System (NIS) must be performed. To remove expeditiously and exactly the faulty area of operation from the system when NIS malfunctions, the test troubleshooting and test procedure must be established. Thus, considering the troubleshooting procedure of NIS for Kori plant unit 1 and the test procedure of IEEE Standard, the structure of each system and the input/output characteristics of each circuit were analyzed. Analyzing the waveforms and the amplitudes of the input/output of each block circuit under all operation conditions, the troubleshooting and test procedures for source range of NIS are established. And also developing the troubleshooting technique using logic circuit for isolation amplifier which was manfactured for trial, the foundation for troubleshooting procedures using microprocessor is prepared. (Atomindex citation 11:553015)

RRC-29 PC **A02**/MF **A01**
Reactor Research Centre, Kalpakkam (India).
Linear Model of the Fast Breeder Test Reactor Plant.
S. S. Kumar, G. Vaidyanathan, and A. Rajakumar. Feb 79, 22p
U.S. Sales Only.

A linear analysis of the Fast Breeder Test Reactor System, consisting of the reactor, intermediate heat exchanger, steam generator and connected piping is presented. The problem of variable boundaries in the steam generator is reduced to a problem of fixed boundaries by dividing the steam generator into six zones. Based upon this, one can obtain the transfer function of any input/output combination. Starting with the time domain nonlinear partial differential equations, the problem is reduced to a system of linear equations in complex variables, which can be solved basically by Gaussian elimination process. The results of this work will be useful in determining a suitable control scheme for waterflow in the steam generator and the control parameters. (Atomindex citation 11:552774)

18F. Radiation Shielding and Protection

BNL-28586 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Features of Possible Polarized Photon BEAMS at High Energy and Corresponding Physics Programme or the Proton Structure Function Using Real Photons.
M. J. Tannenbaum. 1980, 10p CONF-800994-9
Contract AC02-76CH00016
International symposium on H.E. physics with polarized beams and polarized targets, Lausanne, Switzerland, 25 Sep 1980.

In the range of electron energies available at Fermilab, 100 GeV less than or equal to E less than or equal to 500 GeV, coherent Bremsstrahlung in crystals, particularly diamond, gives a huge enhancement to the equivalent photon spectrum at large values of x where x = k/E. The photons in this enhancement are polarized. Requirements on electron beam energy spread, angular divergence and spot size imposed by the use of a diamond as a radiator are discussed. The physics program emphasizes hard processes and tests of QCD using polarization. (ERA citation 06:008450)

HEDL-SA-2193-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Breeder Reactor Program: T-3 Cask.
J. J. Krupar, J. D. Berger, J. D. Berg, and E. T. Weber. 1980, 19p CONF-801107-55
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

A shipping cask system was developed for shipment of irradiated fuels and materials from the Fast Flux Test Facility (FFTF) to participating Hot Cell Examination Facilities. The development work included techniques for remote packaging and cask loading of the materials prior to shipment. The remote handling systems were developed for both horizontal and vertical loading/unloading of various payloads. The T-3 cask was licensed by the United States Nuclear Regulatory Commmission (US NRC) showing compliance with Title 10 of the Code of Federal Regulations, Part 71. (ERA citation 06:006357)

HEDL-SA-2254-FP PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Large-Scale Fission Product Containment Tests.
R. K. Hilliard, and A. K. Postma. Nov 80, 34p CONF-801107-51
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

The Containment Systems Experiment (CSE) program is reviewed, with emphasis on the inherent processes that remove fission products from containment atmospheres and reduce their leakage to the environment. The CSE containment vessel was sized to represent a 1/5 linear scale model of a typical 1000 MW(e) PWR. Nineteen tests were performed in a steam-air atmosphere simulating post-LOCA conditions. In eight tests containment sprays were operated, in five tests a recirculating filter-adsorber loop was operated, and in six tests only natural, passive processes occurred. Sprays were the most effective in removing airborne iodine and particulate aerosols, followed by the filter loop. Although not as effective as the engineered safety features, natural processes of diffusion to surfaces, reaction with paint, gravity settling, and removal in leak paths are shown to be significant. Together they caused a reduction in leakage of 10 exp -2 and 10 exp -3 for iodine and cesium, respectively, during the initial 2-h period. These attenuation factors increased to 10 exp -3 and 10 exp -4 , respectively, for the first 24-h period. (ERA citation 06:006090)

LA-6016-SOP(Rev.1) PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Technical Specifications for the Pajarito Site Critical Experiments Facility.
R. E. Malenfant, and H. C. Paxton. Dec 80, 15p
Contract W-7405-ENG-36

This document is to satisfy the requirement for technical specifications spelled out in DOE Manual Chapter 0540, Safety of DOE-Owned Reactors. Technical specifications are defined in Sec. 0540-048, and the requirement for them appears in Sec. 0540-015. The following technical specifications update the document, Technical Specifications for the Pajarito Site Critical Experiments Facility. (ERA citation 06:008056)

ORNL/TM-7237 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
GCFR Radial Blanket and Shield Experiment.
F. J. Muckenthaler, J. L. Hull, and J. J. Manning. Dec 80, 110p
Contract W-7405-ENG-26

This report presents integral neutron flux, energy spectra, and gamma-ray heating measurements made for the Radial Blanket and Shield Experiment at the ORNL Tower Shielding Facility as part of a continuing Gas Cooled Fast Breeder Reactor program. The experimental configurations were divided into four basic segments: a spectrum modifier inserted into the Tower Shielding Reactor II beam; blanket slabs consisting of either ThO sub 2 or UO sub 2 placed directly behind the spectrum modifier; an inner radial shield behind the blankets; and an outer radial shield to complete the mockup. The segments were added in sequence, with selected measurements made within and beyond each segment. The integral experiment was performed to provide verification of calculational methods and nuclear data used in designing a radial shield for the GCFR and determining the effectiveness of the design. The ThO sub 2 blanket measurements were needed to bracket the uncertainties in the nuclear cross sections for calculating both the neutron transmission through the blanket and the gamma-ray heating rates within the blanket. Measurements with a UO sub 2 blanket were included both as a reference for the ThO sub 2 analysis, neutron transmission through UO sub 2 having been successfully calculated in previous experiments, and to provide comparison information for other breeder reactor designs. (ERA citation 06:006058)

SLAC-PUB-2643 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
Effective Radiological Safety Program for Electron Linear Accelerators.
W. P. Swanson. Oct 80, 4p CONF-801111-35
Contract AC03-76SF00515
Conference on application of accelerators in research and industry, Denton, TX, USA, Nov 1980.

An outline is presented of some of the main elements of an electron accelerator radiological safety program. The discussion includes types of accelerator facilities, types of radiations to be anticipated, activity induced in components, air and water, and production of toxic gases. Concepts of radiation shielding design are briefly discussed and organizational aspects are considered as an integral part of the overall safety program. (ERA citation 06:008451)

18G. Radioactive Wastes and Fission Products

AECL-6186(Rev.1) PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
Radioactive Waste Management in Canada. A Bibliography of Published Literature.
N. J. Hawley. Sep 79, 29p
U.S. Sales Only.

Reports and other Canadian literature on radioactive waste processing and disposal covering the period 1953-1979 are listed. A selected list of international conferences relating to waste management (1959-1979) is attached. (Atomindex citation 11:553024)

AECL-6545 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Current Development Programs for the Disposal of Low- and Intermediate-Level Radioactive Wastes.
D. H. Charlesworth. Aug 79, 15p CONF-7904142-1
Canadian Nuclear Association symposium on the management of radioactive wastes in Canada, Toronto, Canada, 10 Apr 1979.
U.S. Sales Only.

Canadian development work related to the disposal of non-fuel radioactive wastes arising at nuclear generating stations is reviewed. Current programs relate primarily to the conditioning of the wastes into a form suitable for disposal and the definition of criteria for the design and siting of the repository. (Atomindex citation 11:532247)

ANL-80-61 PC **A03**/MF **A01**
Argonne National Lab., IL.
Chemical Engineerig Division Fuel Cycle Programs. Quarterly Progress Report, October-December 1979.
M. J. Steindler, J. K. Bates, R. A. Couture, K. F. Flynn, and T. J. Gerding. Jul 80, 42p
Contract W-31-109-ENG-38

Efforts to characterize and develop metal matrix waste forms with increased resistance to dispersion were continued. Drop-weight tests designed to verify a brittle-material impact-fracture model were carried out using Pyrex glass. Leach-rate studies were continued on ANL-SYNROC samples, using the neutron activation analysis technique. Predicted migration velocities of radiocesium based on distribution coefficients determined in batch experiments with basalt and groundwater solutions were significantly slower than infiltration experiments. The sorption of IO sub 4- from aqueous buffer solutions by Fe sub 2 O sub 3 was determined. It was found that IO sub 4- is sorbed about four times as strongly as IO sub 3- . The transport rate of cesium ions through kaolinite was found to be lower than calculated. One of the reasons suggested for this difference is the presence of iron oxide in the kaolinite. (ERA citation 06:005814)

CONF-801206-4 PC **A03**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Some Deficiencies in Analyzing Leachates and Reporting Results.
C. W. Sill. 1980, 32p
Contract AC07-76ID01570
ORNL conference on the leachability of radioactive solids, Gatinburg, TN, USA, 9 Dec 1980.

Determination of the leachability of elements from various radioactive waste forms for long-term retention requires chemical analysis of both the leachate and waste form. Neither the precision of the leaching procedure nor the accuracy of the results can be determined unambiguously if gross uncertainties exist. It should be demonstrated beforehand that all participating laboratories can obtain the same analytical result within some stated uncertainty. Special precautions must be taken to ensure that all material leached from the waste form is recovered from the leaching container and that all refractory particles are dissolved completely before analysis is begun. The actual results obtained should be reported, including negative signs if present, avoiding all subjective and quantitatively nondescriptive statements such as nil, none, not detected, etc. Each result must be accompanied by an estimate of its uncertainty. Problems involved in interlaboratory comparisons are discussed. (ERA citation 06:005842)

EGG-WM-5295 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Transuranic Waste Program at EG and G Idaho, Inc. Annual Technical Report.
T. H. Smith, and C. R. Tolman. Dec 80, 22p
Contract AC07-76ID01570

This document summarizes the objectives and technical achievements of the transuranic (TRU) waste research and development program conducted at EG and G Idaho, Inc., during fiscal year 1980. The TRU waste activities covered in this report include: INEL TRU Waste EIS (Environmental Impact Statement), including preparation of the EIS, Support Studies, and the Public Participation Program; INEL TRU Waste Projects, including

System Analysis, Stored Waste projects, and Buried Waste projects; and Waste Management Materials Studies, including Process Control and Durability studies. (ERA citation 06:005817)

ENICO-1064 PC **A03**/MF **A01**
Exxon Nuclear Idaho Co., Inc., Idaho Falls.
Leach Testing of Idaho Chemical Processing Plant Final Waste Forms.
R. P. Schuman. Oct 80, 43p
Contract AC07-79ID01675

A number of pellets and highly durable glasses prepared from nonradioactive-simulated high-level waste calcines have been leach tested. The leach tests are patterned on the IAEA standard test and the proposed Materials Characterization Center tests. Most tests are made with static distilled water at 25, 70, 95, 250, and 350 exp 0 C and in refluxing distilled water, Soxhlet, at 95 exp 0 C. Leach rates are determined by analyzing the leachate by instrumental activation analysis or spectrochemical analysis and from weight loss. Leaches are run on glass using cast and core drilled cylinders, broken pieces and coarse ground material. Sample form has a considerable effect on leach rates; solid pieces gave higher leach rates than ground glass when expressed in g/cm exp 2 /day. Cesium, molybdenum and weight loss leach rates of cast glass cylinders in distilled water varied from $<$10 exp -7 g/cm exp 2 /day at 25 exp 0 C to approx. 10 exp -3 g/cm exp 2 /day at 250 exp 0 C. The leach rates in static distilled water at 95 exp 0 C were considerably lower than those in refluxing distilled water, Soxhlet, at the same temperature. Even at 25 exp 0 C, sodium, cesium, and molybdenum readily leached from the porous pellets, but the pellets showed no visible attack at 250 exp 0 C. (ERA citation 06:005818)

GAT-2002 PC **A03**/MF **A01**
Goodyear Atomic Corp., Piketon, OH.
Biodenitrification of Gaseous Diffusion Plant Aqueous Wastes: Stirred Bed Reactor.
M. E. Holland. 3 Oct 80, 43p
Contract AC05-76OR00001

Approximately 30 kilograms of nitrates per day are discarded in the raffinates (acid wastes) of the Portsmouth Gaseous Diffusion Plant's X-705 Uranium Recovery and Decontamination Facility. A biodenitrification process employing continuous-flow, stirred-bed reactors has been successfully used to remove nitrates from similar acid wastes at the Oak Ridge Y-12 Plant. Laboratory studies have been made at Portsmouth to characterize the X-705 raffinates and to test the stirred-bed biodenitrification process on such raffinates. Raffinates which had been previously characterized were pumped through continuous-flow, stirred-bed, laboratory-scale reactors. Tests were conducted over a period of 146 days and involved variations in composition, mixing requirements, and the fate of several metal ions in the raffinates. Tests results show that 20 weight percent nitrates were reduced to a target nitrate effluent concentration of 100 mu g/ml with a 99.64 percent efficiency. However, the average denitrification rate achieved was only 33% of that demonstrated with the Y-12 stirred-bed system. These low rates were probably due to the toxic effects of heavy metal ions on the denitrifying bacteria. Also, most of the uranium in the raffinate feed remained in the biomass and calcite, which collected in the reactor. This could cause criticality problems. For these reasons, it was decided not to make use of the stirred-bed bioreactor at Portsmouth. Instead, the biodenitrification installation now planned will use fluidized bed columns whose performance will be the subject of a subsequent report. (ERA citation 06:007008)

INFCE/DEP/WG-7/19 PC **A03**/MF **A01**
INFCE (Belgium).
Belgian Working Draft on a Repository of Solidified Nuclear Waste in a Deep Tertiary Clay Formation.
Jan 79, 26p
U.S. Sales Only.

Plastic clay layers are a potential geological host formation for disposal of some types of conditioned radioactive wastes. The tertiary Boom clay formation which is extensively studied by CEN/SCK in Mol (Belgium) is described in some details and a series of site specific characteristics are given. On the basis of these data and considering some thermal, geomechanical and operational constraints a feasability study and a preliminary conceptual design was performed for a repository of conditioned HL, ML and alpha wastes arising from a 30 years running 10 GWe nuclear power program. The general geometrical configuration of the subsurface repository, construction details of access and ventilation shafts, main and secondary galleries and burial holes are given. Excavation and lining techniques for the different underground parts of the facility are discussed. An operational diagram for the different types of wastes was developed starting from reception in a surface facility to final burial in the underground. (Atomindex citation 11:532258)

INFCE/DEP/WG-7/9 PC **A03**/MF **A01**
INFCE (U.S.).
Status of Technologies Related to Radioactive Waste Management and Disposal.
Sep 79, 38p
U.S. Sales Only.

The document discusses the status of technologies relevant to radioactive waste management and disposal, as defined by the INFCE Working Group 7 study. All fuel cycle wastes, with the exception of mill tailings, are placed in mined geologic repositories. In addition to the availability of technologies, the document discusses the: a) importance of the systems viewpoint, b) importance of modeling, c) need for site-specific investigations, d) consideration of future sub-surface human activities and e) prospects for successful isolation. In the sections on waste isolation and repository safety assessments, principal considerations are discussed. The document concludes that successful isolation of radioactive wastes from the biosphere appears technically feasible for periods of thousands of years provided that the systems view is used in repository siting and design. (Atomindex citation 11:532257)

INIS-mf-5664 PC **A02**/MF **A01**
Department of the Environment, London (England).
Geological Research and Nuclear Waste Management.
1980, 5p
U.S. Sales Only.

A brief account is given of the arising of radioactive waste as a by-product of nuclear power generation, and the proposal to glassify it for permanent storage. Reference is made to proposals to dispose of the wastes to geological formations on land, below the sea bed, or on the ocean floor. An account is given of a current research programme, coordinated with other Common Market countries, to assess the suitability of geological formations underground to accept the wastes safely. (Atomindex citation 11:526071)

JAERI-M-8323 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Irradiation Stability of Polyethylene Products Incorporating Spent Granular Ion-Exchange Resins.
S. Dojiri, Y. Hayase, and N. Moriyama. Jul 79, 13p
In Japanese.
U.S. Sales Only.

Experiments were made on the irradiation stability of polyethylene products incorporating spent ion-exchange resins (granular) from LWR nuclear power plants. The absorbed doses of the products incorporating actual spent resins were estimated to be about 10 exp 6 to 10 exp 8 rad by calculation. The polyethylene - ion-exchange resin products were prepared with a twin screw extruder and irradiated with an external exp 60 Co gamma -ray source up to 10 exp 9 rad. Although the products turned hard and brittle at doses above 10 exp 8 rad losing their toughness, no significant decrease in the compressive strength was observed up to 10 exp 9 rad. Swelling of the products was not observed up to 10 exp 9 rad. Radiolysis gas generated in the products was mostly hydrogen (81 - 97%) which evolved at a generation rate of about 2.5 x 10 exp -2 cm exp 3 /g.Mrad. For this generation rate, the possibility of hydrogen explosion in storing the polyethylene products in enclosures is discussed. (Atomindex citation 11:526053)

K-2007 PC **A09**/MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
Analysis of a Gas Absorption System with Soluble Carrier Gas and Volatile Solvent.
B. E. Kanak. Jan 80, 186p
Contract W-7405-ENG-26

The effects of column diameter, carrier gas coabsorption, and solvent vaporization on the performance of a packed gas absorption column are examined. The system investigated employs dichlorodifluoromethane as a solvent to remove krypton from a nitrogen stream and is characterized by substantial nitrogen coabsorption. Three columns with diameters of 2, 3, and 4 inches were constructed and packed with 34.5 inches of Goodloe packing. In addition to the more conventional data, the experimental evaluation of these columns included the use of a radioisotope and a gamma scanning technique which provided direct measurement of the columns' molar krypton profiles. A multicomponent gas absorption model was developed, based on the two-film mass transfer theory, that allows the fluxes of all species to interact. Verification of this model was achieved through comparison of the calculated results with experimental data. With the feed gas flow rate between 6 and 36 lb moles/hr-ft exp 2 and the solvent feed rate between 40 and 400 lb moles/hr-ft exp 2 , column diameter was found to have no significant impact on the mass transfer efficiency of this system when carried out in columns with diameters of 2 inches or greater. The absorption of krypton was found to be enhanced and inhibited, respectively, by carrier gas coabsorption and solvent vaporization. An injector system to add gaseous solvent to the feed gas stream prior to its introduction into the packed bed was proposed to eliminate the detrimental effects of solvent vaporization.Using this injector to supersaturate the feed gas stream with solvent enhanced absorber performance in the same manner as carrier gas coabsorption. (ERA citation 05:013152)

LA-8471-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Research and Development Related to the Nevada Nuclear Waste Storage Investigations. Progress Report, April 1-June 30, 1980.
K. Wolfsberg, B. R. Erdal, and J. R. Smyth. Oct 80, 42p
Contract W-7405-ENG-36

Experiments have been initiated to study the sorption of radionuclides on unaltered rock surfaces. Movement of radionuclides through solid or cracked rock cores under the impetus of pumped groundwater is monitored using microautoradiography and gamma counting. Modifications in equipment and methodology are in progress. Solution flow through tuff cores appears to be uniform, whereas in granite the flow is confined to small crack systems. Distribution profiles of residual activity after partial elution have been observed in several cases. (ERA citation 06:008330)

LBL-8764(V.1) PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Geohydrological Studies for Nuclear Waste Isolation at the Hanford Reservation. Volume I. Executive Summary.
J. Apps, T. Doe, and B. Doty. Aug 79, 31p
Contract W-7405-ENG-48

A study of the hydrology of the Pasco Basin near Richland, Washington, was initiated during FY 1978 as part of a long-term study on the feasibility of nuclear waste disposal in the Columbia River Basalt underlying the Hanford Reservation. This report summarizes the hydrology field program, Pasco Basin modeling, and groundwater chemistry program. Hanford well logs are also reviewed. (ERA citation 05:001968)

MLM-2792 PC **A03**/MF **A01**
Mound Facility, Miamisburg, OH.
Incineration of LWR-Type Waste in the Mound Cyclone Incinerator: A Feasibility Study.
B. M. Alexander. 23 Dec 80, 28p
Contract AC04-76DP00053

The Mound Cyclone Incinerator has been demonstrated for several years for combustion of radwaste containing plutonium. It is now being developed for volume reduction of radwaste from light

water reactor (LWR) facilities containing mixed beta- and gamma-emitters. To this end, a laboratory-scale feasibility study has been developed and executed. Development of the feasibility study was based on known characteristics of LWR waste and on operating data compiled for the Mound Cyclone Incinerator since 1975. Feed spiked with several isotopes found in LWR waste was burned in the laboratory-scale cyclone incinerator, and samples collected and analyzed. From these data, the applicability of cyclone incineration was demonstrated, and an efficient scrub liquor composition was chosen for the offgas treatment system. A Health Physics survey of the incinerator system after incineration of 220 mu Ci of beta/gamma activity showed no exposure readings above background levels. Supplemental experiments were also performed to determine the effect of the chemical form of iodine on its volatility, as well as to calculate the cost-benefit relationship for the addition of potassium iodide to scrub liquor. (ERA citation 06:007011)

ONWI-128(V.1) PC **A05**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Waste Isolation Safeguards and Security System. Volume 1. Scoping Study.
J. H. Ellis, K. E. Plummer, H. G. Tepp, D. E. Savage, and J. R. Butcher. Sep 80, 85p
Contract AC06-76RL01830

The purpose of this study is to define the rationale and scope of the Waste Isolation System (WIS) safeguards system, to establish a set of proposed basic safeguards criteria, and to identify the areas requiring development of specific criteria and technology. The report also presents a proposed program schedule and provides an extensive bibliography of applicable reference safeguards documents. Volume one contains the following: glossary, system description; threat definition; safeguards regulations review - current and future; WIS safeguards criteria; assessment of criteria applicability and development requirements; and program plan. (ERA citation 06:007069)

ONWI-128(V.2) PC **A99**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Waste Isolation Safeguards and Security System. Volume 2. Bibliography.
J. H. Ellis, K. E. Plummer, H. G. Tepp, D. E. Savage, and J. R. Butcher. Sep 80, 605p
Contract AC06-76RL01830

The purpose of this study is to define the rationale and scope of the Waste Isolation System (WIS) safeguards system, to establish a set of proposed basic safeguards criteria, and to identify the areas requiring development of specific criteria and technology. The report also presents a proposed program schedule and provides an extensive bibliography, in volumes two and three of applicable reference safeguards documents. (ERA citation 06:007070)

ONWI-128(V.3) PC **A06**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Waste Isolation Safeguards and Security System. Volume 3. Bibliography Supplement.
J. H. Ellis, K. E. Plummer, H. G. Tepp, D. E. Savage, and J. R. Butcher. Sep 80, 122p
Contract AC06-76RL01830

The purpose of this study is to define the rationale and scope of the Waste Isolation System (WIS) safeguards system, to establish a set of proposed basic safeguards criteria, and to identify the areas requiring development of specific criteria and technology. The report also presents a proposed program schecule and provides an extensive bibliography in volumes two and three of applicable reference safeguards documents. (ERA citation 06:007071)

ORNL/TM-7431 PC **A10**/MF **A01**
Oak Ridge National Lab., TN.
Decay Characteristics of Once-Through LWR and LMFBR Spent Fuels, High-Level Wastes, and Fuel-Assembly Structural Material Wastes.
A. G. Croff, and C. W. Alexander. Nov 80, 215p
Contract W-7405-ENG-26

The decay characteristics of spent fuel, high-level waste, and fuel-assembly structural material (cladding) waste are presented in the form of ORIGEN2 output tables for (1) a pressurized water reactor operating on a once-through cycle with low-enrichment uranium feed, (2) a boiling-water reactor operating on a once-through cycle with low-enrichment uranium feed, and (3) a liquid-metal fast breeder reactor being fueled with depleted uranium enriched with discharged light water reactor plutonium on a once-through basis. The decay characteristics given include the mass (g), radioactivity (Ci), thermal power (W), photon activity (photons/s and MeV/W-s in 18 energy groups), and neutron activity (neutrons/s) from (alpha ,n) and spontaneous fission events. The first three characteristics are given for each element and for the principal nuclide contributors to the activation products, actinides, and fission products. Also included are a summary description of the ORIGEN2 reactor models that form the basis for the calculated results and a physical description of the fuel assemblies for the three reactors. (ERA citation 06:007013)

PNL-2939 PC **A13**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Finite-Element Three-Dimensional Ground-Water (FE3DGW) Flow Model - Formulation, Program Listings and Users' Manual.
S. K. Gupta, C. R. Cole, and F. W. Bond. Dec 79, 283p
Contract EY-76-C-06-1830

The Assessment of Effectiveness of Geologic Isolation Systems (AEGIS) Program is developing and applying the methodology for assessing the far-field, long-term post-closure safety of deep geologic nuclear waste repositories. AEGIS is being performed by Pacific Northwest Laboratory (PNL) under contract with the Office of Nuclear Waste Isolation (OWNI) for the Department of Energy (DOE). One task within AEGIS is the development of methodology for analysis of the consequences (water pathway) from loss of repository containment as defined by various release scenarios. Analysis of the long-term, far-field consequences of release scenarios requires the application of numerical codes which simulate the hydrologic systems, model the transport of released radionuclides through the hydrologic systems to the biosphere, and, where applicable, assess the radiological dose to humans. Hydrologic and transport models are available at several levels of complexity or sophistication. Model selection and use are determined by the quantity and quality of input data. Model development under AEGIS and related programs provides three levels of hydrologic models, two levels of transport models, and one level of dose models (with several separate models). This document consists of the description of the FE3DGW (Finite Element, Three-Dimensional Groundwater) Hydrologic model third level (high complexity) three-dimensional, finite element approach (Galerkin formulation) for saturated groundwater flow. (ERA citation 05:020172)

PNL-3479 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Description of Processes for the Immobilization of Selected Transuranic Wastes.
C. L. Timmerman. Dec 80, 42p
Contract AC06-76RL01830

Processed sludge and incinerator-ash wastes contaminated with transuranic (TRU) elements may require immobilization to prevent the release of these elements to the environment. As part of the TRU Waste Immobilization Program sponsored by the Department of Energy (DOE), the Pacific Northwest Laboratory is developing applicable waste-form and processing technology that may meet this need. This report defines and describes processes that are capable of immobilizing a selected TRU waste-stream consisting of a blend of three parts process sludge and one part incinerator ash. These selected waste streams are based on the compositions and generation rates of the waste processing and incineration facility at the Rocky Flats Plant. The specific waste forms that could be produced by the described processes include: in-can melted borosilicate-glass monolith; joule-heated melter borosilicate-glass monolith or marble; joule-heated melter aluminosilicate-glass monolith or marble; joule-heated melter basaltic-glass monolith or marble; joule-heated melter glass-ceramic monolith; cast-cement monolith; pressed-cement pellet; and cold-pressed sintered-ceramic pellet. (ERA citation 06:007017)

PNL-3516 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Comparative Waste Forms Study.
J. W. Wald, R. O. Lokken, J. W. Shade, and J. M. Rusin. Dec 80, 59p
Contract AC06-76RL01830

A number of alternative process and waste form options exist for the immobilization of nuclear wastes. Although data exists on the characterization of these alternative waste forms, a straightforward comparison of product properties is difficult, due to the lack of standardized testing procedures. The characterization study described in this report involved the application of the same volatility, mechanical strength and leach tests to ten alternative waste forms, to assess product durability. Bulk property, phase analysis and microstructural examination of the simulated products, whose waste loading varied from 5% to 100% was also conducted. The specific waste forms investigated were as follows: Cold Pressed and Sintered PW-9 Calcine; Hot Pressed PW-9 Calcine; Hot Isostatic Pressed PW-9 Calcine; Cold Pressed and Sintered SPC-5B Supercalcine; Hot Isostatic pressed SPC-5B Supercalcine; Sintered PW-9 and 50% Glass Frit; Glass 76-68; Celsian Glass Ceramic; Type II Portland Cement and 10% PW-9 Calcine; and Type II Portland Cement and 10% SPC-5B Supercalcine. Bulk property data were used to calculate and compare the relative quantities of waste form volume produced at a spent fuel processing rate of 5 metric ton uranium/day. This quantity ranged from 3173 L/day (5280 Kg/day) for 10% SPC-5B supercalcine in cement to 83 L/day (294 Kg/day) for 100% calcine. Mechanical strength, volatility, and leach resistance tests provide data related to waste form durability. Glass, glass-ceramic and supercalcine ranked high in waste form durability where as the 100% PW-9 calcine ranked low. All other materials ranked between these two groupings. (ERA citation 06:007019)

PRAV-1-33 PC **A02**/MF **A01**
Programraadet foer Radioaktivt Avfall, Stockholm (Sweden).
Conditioning of Nuclear Power Wastes for Final Disposal: Use of Zeolites in Reactor Waste Treatment.
R. Arnek, I. Grenthe, and A. Persson. Oct 79, 21p
U.S. Sales Only.

The aim has been to investigate the use of inorganic ion exchangers, especially zeolites, in the treatment of radioactive waste solutions. The idea is to sorb long-lived nuclides on the ion exchanger and then by e.g. sintering, to transform it into a physical form - ceramics or glass - that is stable against leaching and well adapted for final disposal. Initially the work was directed mainly towards high-level waste from reprocessing but gradually the efforts were concentrated on medium level reactor waste, primarily spent ion exchange resins. Initially the work was directed mainly towards high-level waste from reprocessing but gradually the efforts were concentrated on medium level reactor waste, primarily spent ion exchange resins. A system has been built upon a liter-scale for the transfer of longlived nuclides from spent granular organic ion exchange resin to inorganic ion exchangers. The transfer is achieved by eluting the organic resins with a complexing agent, e.g. tartrate, and then sorbing the eluted nuclides on inorganic ion exchangers. For the sorption of cesium mordenite was used, which proved most efficient. Attempts to replace organic ion exchange resions in the reactor water clean up system with zeolites were not successful - the leakage of sodium, aluminium and silicate from the zeolite was unsatisfactorily high. Zeolites have a potential use for the treatment of contaminated waters such as fuel storage basin water and floor drainage, which was experimentally demonstrated at a power plant. (Atomindex citation 11:526052)

RFP-2944 PC **A02**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.

Waste Incineration and Immobilization for Nuclear Facilities. Status Report, April-September 1978.
A. J. Johnson, P. M. Williams, S. C. Burkhardt, J. A. Ledford, and K. Y. Gallagher. 10 Dec 80, 18p
Contract AC04-76DP03533

The fluidized bed incinerator and waste immobilization processes are being developed to process various liquid and solid wastes that are generated by a nuclear facility. The versatility of the incinerator liquid waste handling system has been enhanced by recent changes made in the pumping and related piping system. Tributyl phosphate-solvent incineration has been evaluated thoroughly using the pilot plant fluidized bed incinerator. Vitrified glass pellets were made to determine operating parameters of a resistance-heated reactor and to produce samples for testing. Procedures were developed for testing the product pellets. A simplified start-up procedure was devised as development continued on a second type of reactor, the Joule-heated melter. (ERA citation 06:007020)

RFP-3082 PC **A02**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.
Nuclear Waste Immobilization. Status Report, October 1978-March 1979.
A. J. Johnson, P. M. Williams, and J. A. Ledford. 10 Dec 80, 12p
Contract AC04-76DP03533

Immobilization of incinerator ash and other high-volume, low-density, transuranium-contaminated waste is being accomplished using a bench-scale vitrification system. Samples of waste glass have been prepared with the system and are undergoing testing to measure thermal-shock resistance and mechanical durability. The samples have successfully passed a Department of Transportation Special Form test. Thermal-shock resistance, as expected with glass, decreased notably after the initial shock. Title I design of the waste immobilization pilot plant has been completed and approved; Tital II design is presently underway. A Davis-Bacon evaluation to establish whether construction will be done by Plant maintenance or an outside contractor is now being completed. (ERA citation 06:007021)

RFP-3162 PC **A03**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.
Soil Decontamination Criteria Report, November 1980.
G. A. Riordan. 10 Dec 80, 31p
Contract AC04-76DP03533

A program to access the extent of transuranic soil contamination at DOE sites and to develop methods for their decontamination is underway at Rocky Flats. As part of this program, acceptable soil contamination levels for plutonium proposed by a number of authorities over the past couple of decades were reviewed. From this review, goals for soil decontamination work are proposed. These goals, which relate to the disposition of the products of a decontamination process, are summarized as follows (dpm/g will refer to disintegrations per minute of transuranic nuclides per gram of soil): soil fractions having less than 30 dpm can be disposed of as surface soil with unrestricted usage. Fine soil fractions (less than 100 mu m) that have less than 500 dpm and coarse soil fractions that have less than 1000 dpm can be disposed of as subsurface soil as long as usage is controlled to ensure compliance with EPA dosage guidance. Soil concentrates that have an activity greater than the above values but less than 22,000 dpm should be interred in an approved, low level waste burial site. Soil concentrates that are greater than 22,000 dpm should be stored as retrievable waste. Changes in the technical and legal areas of soil decontamination are rapid. Permissible soil decontamination levels will change as will decontamination technology and the ability to monitor the effectiveness of the decontamination processes. As a result, annual updates of decontamination criteria, goals, and monitoring are expected. (ERA citation 06:007064)

RHO-LD-124 PC **A02**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Laboratory Studies of Complexed Waste Slurry Volume Growth in Tank 241-SY-101.
C. Delegard. Dec 80, 25p
Contract AC06-77RL01030

The growth of waste volume in complexant laden Hanford waste slurry was found to be due to gas generation caused by the oxidative degradation of the complexant HEDTA. The complexant EDTA was found to be stable in this slurry. The degradation proceeds according to first order kinetics in both NaAlO sub 2 and HEDTA concentration and requires nitrate and/or nitrite to proceed. The dependence of reaction rate on NaOH concentration goes through a maximum implying the formation of an aluminum-HEDTA-hydroxide intermediate reactive species. The reaction products are an unidentified complexant and several gas species; principally N sub 2 , N sub 2 O and H sub 2 . At 120 exp 0 C HEDTA has a half-life of approx. 100 hours in simulated Tank 101-SY slurry. The reaction shows an Arrhenius dependence of reaction rate on temperature at 60 to 120 exp 0 C. Aarrhenius activation energy is 24.5 kcal/mole. (ERA citation 06:005826)

RHO-LD-139 PC **A16**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Technical Status Report on Environmental Aspects of Long-Term Management of High-Level Defense Waste at the Hanford Site.
Oct 80, 359p
Contract AC06-77RL01030

Since 1944, radioactive wastes have accumulated at the US Department of Energy's (DOE) 1500-km exp 2 Hanford Site in southeastern Washington, where nine nuclear reactors have produced nuclear materials for National defense. Today, only one production reactor is still operating, but a large inventory of radioactive high-level waste (HLW), the residue from processing the spent fuel to recover plutonium and uranium, remains stored in underground tanks and in metal capsules in water basins. So that this waste will pose no significant threat to the public health and safety, it must be isolated from the biosphere for thousands of years. This document contains an evaluation of environmental impacts of four alternative methods for long-term management of these HLW. The alternatives range from continuing the present action of storing the waste near the surface of the ground to retrieving the waste and disposing of it deep underground in a mined geologic repository. The alternatives are: near-term geologic disposal of stored waste; deferred geologic disposal of in-tank waste; in situ disposal of in-tank waste; and continued present action for stored waste. The environmental impacts of the four alternatives are small relative to that radiation received from natural sources or the available natural resources in the earth. (ERA citation 06:007065)

RHO-LD-140 PC **A10**/MF **A01**
Atomics International Div., Richland, WA. Energy Systems Group.
Environmental Aspects of Long-Term Management Alternatives for High-Level Defense Waste at the Hanford Site.
W. M. Hayward, and R. J. Jensen. Oct 80, 220p
Contract AC06-77RL01030

This report provides detailed background information in support of a broader document titled Technical Status Report on Environmental Aspects of Long-Term Management of High-Level Defense Waste at the Hanford Site, which provides information on possible alternatives for disposal of high-level in-tank and encapsulated wastes derived from the national defense program at Hanford. This report is one of two background reports that support that document, and focuses on the environmental aspects of those alternatives. A long-term HLW management program is being conducted to assess the various alternatives for the disposal of these wastes and to develop the technology necessary to implement the alternative selected. This report describes the status of preliminary environmental evaluations of the alternatives considered to date. The following topics are covered: human radiological health effects; nonradiological occupational health effects; routine population radiological dose; population dose from operating accidents; radiological consequences from loss of institutional control and post-disposal events; resource availability of cement, chromium, copper, lead, nickel, nitric acid, petroleum, and electricity; societal effects; and ecological effects. Figures and numerous tables are presented. (ERA citation 06:005845)

RHO-LD-141 PC **A17**/MF **A01**
Atomics International Div., Richland, WA. Energy Systems Group.
Technical Aspects of Long-Term Management Alternatives for High-Level Defense Waste at the Hanford Site.
1980, 389p
Contract AC06-77RL01030

This report provides information on technical aspects of nine alternative methods for long-term management of the radioactive high-level waste at the Hanford Site. The general alternatives, each including provisions for both in-tank and encapsulated wastes, range from continuing present action (storing the waste near the surface of the ground) to retrieving the waste and disposing of it deep underground in a mined geologic repository. Topics discussed are: description of Hanford high-level defense waste; descriptions of specific alternatives; modular process descriptions; cost estimates and resource requirements; and effluents and wastes. The report includes figures, appendices, numerous tables, an introduction and a summary. (ERA citation 06:005827)

RHO-LD-144 PC **A03**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Fissile Analysis of Hanford Waste Using Californium Multiplier/Delayed Neutron Counter System.
K. R. Shah. Oct 80, 33p
Contract AC06-77RL01030

Measurement of low-level (10 ng/g or lower) fissile material (mainly plutonium) in Hanford waste and process samples is becoming increasingly important. A system has been designed consisting of a Californium Multiplier (CFX) and a Delayed Neutron Counter (DNC) to characterize these samples. This report describes hardware and analytical capability of the CFX/DNC system. (ERA citation 06:005829)

RHO-SA-183 PC **A04**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Criticality Parameters of 55-Gallon Waste Drum Arrays.
W. A. Blyckert, and R. D. Carter. 7 Nov 80, 55p
CONF-801107-58
Contract AC06-77RL01030
ANS international conference, Washington, DC, USA, 17 Nov 1980.

This study shows the effects of various parameters on the k-effective of two- and three-dimensionally infinite arrays of 55-gallon drums loaded with plutonium-contaminated wastes. Parameters investigated include fissile material composition, neutron moderation, fissile shape, density and mass, array size, reflectors, iron weight of the drums and array collapse. Changes in fissile density caused very large changes in array k-effective (and k-infinity) of up to 0.30, because of changes in neutron absorption in the drum walls. Differences in k-effective of up to 0.07 were shown between arrays of 17C and 17H drums. (ERA citation 06:006359)

SGAE-3067 PC **A03**/MF **A01**
Oesterreichische Studiengesellschaft fuer Atomenergie G.m.b.H., Vienna.
Thermal Conductivity of Solidified Waste Products.
W. Neumann. Nov 79, 33p ME-174/79
U.S. Sales Only.

Thermal conductivity is an important property of solidified high-level waste with regard to the dissipation of radiation induced heat. Measurements of the conductivity of waste calcines from spray and fluidized bed calciner, HLW borosilicate glass and waste containing ceramic granules embedded in metal matrix are described. The results obtained are compared with many data published, a short review over conductivity values of alternative

waste products is given. (Atomindex citation 11:553100)

18H. Radioactivity

CEGB-RD/B/N-4531 PC **A02**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
Measurement of the Specific Activity of exp 41 Ar in the Coolant at Hinkley Point B Nuclear Power Station.
R. Wilson. Aug 79, 14p
U.S. Sales Only.

The measurement of the specific activity of exp 41 Ar in the coolant at Hinkley Point B Nuclear Power Station is described. The measurements were made to enable the annual discharge rate of exp 41 Ar from an AGR to be estimated. Methods for the routine monitoring of exp 41 Ar discharges from an AGR are also briefly considered. (Atomindex citation 11:525916)

CONF-791234-8 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Russian Experience.
J. R. Trabalka. 1979, 15p
Contract W-7405-ENG-26
Environmental decontamination workshop, Oak Ridge, TN, USA, 4 Dec 1979.

A review of the Soviet literature on radioecology and decontamination of soils indicates that most of their environmental decontamination philosophy has been directed toward remedial measures for contamination resulting from catastrophic events (i.e., from nuclear weapons or major accidents) that could contaminate hundreds of square kilometers or more of land and water surfaces. As a consequence, very practical approaches have been suggested to deal with these problems. Approaches which employ equipment which is generally available for soil decontamination and techniques which are most cost effective seem to be preferred. Techniques used for both terrestrial and aquatic decontamination are discussed. Emphasis is placed on the reclamation of areas contaminated with exp 90 Sr. (ERA citation 06:008124)

EGG-2042 PC **A03**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Environmental Surveillance for the INEL Radioactive Waste Management Complex. Annual Report, 1979.
L. E. Wickham, and D. H. Janke. Dec 80, 38p
Contract AC07-76ID01570

This document is the 1979 annual environmental surveillance report for the Radioactive Waste Management Complex (RWMC) of the Idaho National Engineering Laboratory. Included are tabulated data from and discussions about routine radiological monitoring of atmospheric, hydrologic, geologic, and biotic environments of the RWMC. Also included are discussions of selected nonradiological pollutants (e.g., sodium, etc.). It is concluded that (a) RWMC operations have not adversely affected local, existing environments; (b) environmental conditions within the Transuranic Storage Area are not corrosive enough to adversely affect transuranic waste storage containers, and (c) the addition of lakebed soil to pit, trench, and soil test plot areas has altered the moisture cycle characteristic of RWMC soil. (ERA citation 06:007061)

FS-78-15-AKU PC **A06**/MF **A01**
Fachverband fuer Strahlenschutz e.V., Karlsruhe (Germany, F.R.). Arbeitskreis Umweltueberwachung.
Recommendations for the Monitoring of Environmental Radioactivity. Loose-Leaf Collection. 1ST Subset.
M. Winter, J. Narrog, and M. Friedrich. Dec 79, 105p
In German.
U.S. Sales Only.

The work team 'Environmental Monitoring (AKU) of the German-Swiss Fachverband e.V. has always been seeing its main task in offering a common forum to all members professionally dealing with the control of environmental radioactivity on which subject-related problems can be exchanged. The recommendation is directed to all persons having to carry out or to judge measuring programmes for environmental monitoring near nuclear facilities. (Atomindex citation 11:546784)

GSF-S-617 PC **A03**/MF **A01**
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich (Germany, F.R.). Inst. fuer Strahlenschutz.
Investigations of the Emission of Radionuclides from Coal Fired Power Plants. Methods of Analysis and Measured Results for a Hard Coal Power Plant and a Brown Coal Power Plant.
B. Chatterjee, H. Hoetzl, G. Rosner, and R. Winkler. Feb 80, 44p
In German.
U.S. Sales Only.

Samples of coal, brown coal, bottom ash, collected fly ash and 4 sieve fractions of collected fly ash from various electrostatic filter stages as well as samples of escaping fly ash, all taken simultaneously on 3 operating-days, have been investigated. In samples from coal through fly ash sieve fractions U-238, Th-232, Ra-226, Pb-210 and K-40 have been determined by gamma -spectrometry, Po-210 by chemical separation with subsequent alpha -spectrometry. In escaping fly ash samples, which are available in small amounts only (ca. 1 g or less), after chemical separation U-238, U-234, Th-232, Th-230, Th-228 and Po-210 were determined by alpha -spectrometry and Pb-210 by low-level beta -counting. Furthermore, Po-210 has been determined by direct alpha -spectrometry in several particle size fractions collected with a cascade impactor from the exhaust stream. The analytical procedures, which partially had to be developed for the purposes of the present study, are presented shortly. Specific activities of escaping fly ash are in good agreement with specific activities of the fly ash collected from the last electrostatic precipitator stage, provided that, for the latter, the particle size distribution in escaping fly ash is taken into account. Using these specific activities annual air-borne radionuclide emissions are calculated. The resulting activity concentrations in ground level air are compared to values of natural radioactivity. (Atomindex citation 11:546745)

GSF-S-620 PC **A02**/MF **A01**
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich (Germany, F.R.). Inst. fuer Strahlenschutz.
Statistical Aspects in Radioactivity Measurements.
H. Hoetzl. Oct 79, 25p
U.S. Sales Only.

This report contains a summary of basic concepts and formulae important for the treatment of errors and for calculating lower limits of detection in radioactivity measurements. Special attention has been paid to practical application and examples which are of interest for scientists working in this field. (Atomindex citation 11:549412)

HEDL-TME-80-52 PC **A04**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
FFTF Preoperational Survey. Program Report.
B. L. Twitty, and H. J. Bicehouse. Dec 80, 58p
Contract AC14-76FF02170

The FFTF will become operational with criticality early in 1980. This facility is composed of the test reactor, fuel examination cells, expended fuel storage systems and fuel handling systems. The reactor and storage systems are sodium-cooled with the heat load dumped to the ambient air through heat exchangers. In order to assure that the operation of the FFTF has minimal impact on the environment, a monitoring program has been established. Prior to operation of a new facility, a preoperational environmental survey is required. It is the purpose of this report to briefly describe the environmental survey program and to provide the background data obtained during the preoperational phase of the survey program. Nine stations in the program of particular importance to FFTF are discussed in detail with results of monitoring given. No unexplained trends were noted. (ERA citation 06:006470)

ORNL/TM-7290 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Evaluation of Some exp 90 Sr Sources in the White Oak Creek Drainage Basin.
A. M. Stueber, D. D. Huff, N. D. Farrow, J. R. Jones, and I. L. Munro. Jan 81, 47p
Contract W-7405-ENG-26

The drainage basin was monitored to evaluate the relative importance of each source as a contributor to exp 90 Sr in White Oak Creek. The various sources fall into two general categories, those whose exp 90 Sr discharge is dependent upon rainfall and those relatively unaffected by the level of precipitation. The identification and ranking of existing non-point sources of exp 90 Sr in the White Oak Creek basin represents an important step in the ongoing comprehensive program at ORNL to provide a scientific basis for improved control measures and future disposal practices in solid waste disposal areas. (ERA citation 06:006471)

ORNL/TM-7491 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Recommendations Concerning Research and Model Evaluation Needs to Support Breeder Reactor Environmental Radiological Assessments.
C. W. Miller, D. E. Dunning, Jr., E. L. Etnier, D. C. Kocher, and L. M. McDowell-Boyer. Dec 80, 44p
Contract W-7405-ENG-26

Purpose of this report is to present recommendations concerning needs for model evaluations, environmental research, and biomedical research to support breeder reactor environmental radiological assessments. More data are needed to specify dry deposition velocities and to validate plume depletion models. More atmospheric dispersion data are required to characterize flow near buildings, in complex terrain, and for travel distances at 100 km or more. Field data are needed for terrestrial food chain transport models, especially those used to assess the impact of acute radionuclide releases. Efforts are needed to develop models for the estimation of dose from external exposure to photons from a finite, elevated plume resulting from an acute radionuclide release to the atmosphere. Estimates of doses to man from internally deposited radionuclides require scrutiny. Further study of tritium is needed to determine its dependence on dose and dose rate and to specify the relative toxicity of various physiochemical forms of tritium in the environment. (ERA citation 06:006093)

PATENT-4 196 176
Not available NTIS
Department of Energy, Washington, DC.
Method and Apparatus for Controlling Accidental Releases of Tritium.
Patent,
T. R. Galloway. Filed 3 Aug 78, patented 1 Apr 80, 4p PAT-APPL-930 629
Supersedes PAT-APPL-930 629-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An improvement in a tritium control system based on a catalytic oxidation reactor is provided wherein accidental releases of tritium into room air are controlled by flooding the catalytic oxidation reactor with hydrogen when the tritium concentration in the room air exceeds a specified limit. The sudden flooding with hydrogen heats the catalyst to a high temperature within seconds, thereby greatly increasing the catalytic oxidation rate of tritium to tritiated water vapor. Thus, the catalyst is heated only when needed. In addition to the heating effect, the hydrogen flow also swamps the tritium and further reduces the tritium release. (ERA citation 06:004024)

SIS-1979-3 PC **A02**/MF **A01**
Statens Inst. for Straalehygiene, Oslo (Norway).
Radioactivity in Building Materials. Memorandum to the National Pollution Inspectorate.
E. Stranden. 1979, 6p
In Norwegian.
U.S. Sales Only.

The object of this brief report is to make the pollution inspectorate aware of the radiation hazards in-

volved in new building materials, such as gypsum boards and alum slate based concrete blocks whose radium content is high. Experience in Swedish housebuilding has shown that a significant increase in the radiation dose to the occupants can occur. Improved insulation and elimination of draughts in fuel conservation accentuate the problem. Norwegian investigations are referred to and OECD and Scandinavian discussions aiming at recommendations and standards are mentioned. Suggested measures by the Norwegian authorities are given. (Atomindex citation 11:531430)

SIS-1979-4 PC **A02**/MF **A01**
Statens Inst. for Straalehygiene, Oslo (Norway).
Method for Evaluating Building Materials with a High Content of Radioactivity.
E. Stranden. 1979, 9p
In Norwegian.
U.S. Sales Only.

In order to avoid increased radiation doses to the population due to the introduction of building materials with an unusually high content of radioactivity, a method for evaluating building materials has been developed. An expression for the gamma radiation due to radium, thorium and potassium 40 has been proposed by a Scandinavian group. When this value for a given material does not exceed 1, then no restriction is placed. Should it exceed 1, then the material is subjected to further investigation. Similarly, since the radon concentration depends on the radium content, an expression for this is proposed. Should this be less than unity the material may be sold freely. Should it exceed unity, further investigations must be made. Measurements have also been made on the exhalation of radon from concrete, and the results are given. An expression including this exhalation rate and the ventilation rate, giving the radon concentration is given. (Atomindex citation 11:531431)

UCRL-85084 PC **A02**/MF **A01**
Lawrence Livermore National Lab., CA.
Deposition and Dose from the May 18, 1980 Eruption of Mount St. Helens.
K. R. Peterson. Nov 80, 12p CONF-801160-1
Contract W-7405-ENG-48
Symposium and workshop on the Mount St. Helens eruption, Washington, DC, USA, 18 Nov 1980.

The downwind deposition and radiation dose have been calculated for the tropospheric part of the ash cloud from the May 18, 1980 eruption of Mount St. Helens, using a large-cloud diffusion model. At that time the naturally occurring radionuclides of radium and thorium, whose radon daughters normally seep very slowly from the rocks and soil, were violently released to the atmosphere. The largest dose to an individual from these nuclides is small (in the microrem range), but the population dose to those affected by the radioactivity in the ash is about 100 person-rem. This population dose from Mount St. Helens is much greater than the annual person-rem routinely released by a typical large nuclear power plant. It is estimated that subsequent eruptions of Mount St. Helens have doubled or tripled the person-rem calculated for the initial large eruption; this total population dose is about the same as the lower-bound estimate of the population dose from the 1979 accident at the Three Mile Island nuclear power plant. The long-range global ash deposition of the May 18 eruption has been estimated through 1984, using a global deposition model. The maximum deposition is nearly 1000 kg/km exp 2 and occurs in the spring of 1981 over middle latitudes of the Northern Hemisphere. (ERA citation 06:006460)

18I. Reactor Engineering and Operation

AREAEE-219 PC **A02**/MF **A01**
Atomic Energy Establishment, Inshas (Egypt).
Burnout Heat Flux in Natural Flow Boiling.
M. M. Helal, M. A. Darwish, and S. I. Mahmoud. 1978, 22p
U.S. Sales Only.

Twenty runs of experiments were conducted to determine the critical heat flux for natural flow boiling with water flowing upwards through annuli of centrally heated stainless steel tube. The test section has concentric heated tube of 14mm diameter and heated lengthes of 15 and 25 cm. The outside surface of the annulus was formed by various glass tubes of 17.25, 20 and 25.9mm diameter. System pressure is atmospheric. Inlet subcooling varied from 18 to 5 exp 0 C. Obtained critical heat flux varied from 24.46 to 62.9 watts/cm exp 2 . A number of parameters having dominant influence on the critical heat flux and hydrodynamic instability (flow and pressure oscillations) preceeding the burnout have been studied. These parameters are mass flow rate, mass velocity, throttling, channel geometry (diameters ratio, length to diameter ratio, and test section length), and inlet subcooling. Flow regimes before and at the moments of burnout were observed, discussed, and compared with the existing physical model of burnout. (Atomindex citation 11:549235)

AWRE-44-86-141 PC **A05**/MF **A01**
Ministry of Defence, Foulness (England). Atomic Weapons Research Establishment.
Depressurisation Studies. Phase 3: Results of Tests 142 and 143.
A. R. Edwards, B. O. Borgartz, R. M. E. Goodman, T. P. O'Brien, and M. S. Rawlingson.
Aug 77, 92p
U.S. Sales Only.

A basic experimental programme involving the sudden depressurisation of a simple pipe system containing water at 3.45 to 17.24MPa pressure and temperatures between 220 and 250 exp 0 C has been concluded. Measurements were made of transient density, pressure, and temperature variations in a two-phase fluid in the system during the discharge. Phase 3 tests, which are reported, examined the blowdown of a straight 206m dia pipe, 4m long, with particular emphasis on the transient void distribution across a section of the pipe. The results of two tests are detailed. (Atomindex citation 11:546751)

AWRE-44-86-142 PC **A05**/MF **A01**
Ministry of Defence, Foulness (England). Atomic Weapons Research Establishment.
Depressurisatıcn Studies. Phase 3: Results of Tests 144 and 145.
A. R. Edwards, B. O. Borgartz, R. M. E. Goodman, T. P. O'Brien, and M. Rawlingson.
Aug 77, 80p
U.S. Sales Only.

Results are presented for two further tests in Phase 3 of an experimental programme involving the sudden depressurisation of a simple pipe system containing water at pressures of 3.45 to 17.24MPa and temperatures between 220 exp 0 and 250 exp 0 C. Measurements were made of the transient density, pressure and temperature variations in a two-phase fluid on the system during the discharge. Blowdown of a straight 206mm dia pipe, 4m long was examined with particular emphasis on transient void distribution across a section of the pipe. (Atomindex citation 11:546752)

AWRE-44-86-147 PC **A05**/MF **A01**
Ministry of Defence, Foulness (England). Atomic Weapons Research Establishment.
Depressurisation Studies. Phase 2: Results of Tests 115 and 130.
A. R. Edwards, B. O. Borgartz, R. M. E. Goodman, T. P. O'Brien, and M. Rawlingson. Jan 78, 94p
U.S. Sales Only.

Investigations into phenomena which might influence the course of a loss-of-coolant accident in a water reactor system have included depressurization studies of geometrically simple systems from typical reactor operating conditions. Tests on a simple pipe system containing water at pressures between 3.45 and 17.24 MPa and temperatures in the range of 200 exp 0 to 250 exp 0 C have been concluded. Measurements were made of transient density, pressure and temperature variations in a two-phase fluid system during discharge. Phase 1 tests, previously reported, investigated blowdown from straight pipes 4m long with constant internal diameters of 73 and 32 mm. Phase 2 tests incorporated a reservoir added to the 32mm dia pipe. This report is the first of three giving results of Phase 2 tests. It also includes a description of the test assembly, the instrumentation and the experimental procedure. (Atomindex citation 11:546748)

AWRE-44-86-151 PC **A05**/MF **A01**
Ministry of Defence, Foulness (England). Atomic Weapons Research Establishment.
Depressurisation Studies. Phase 2: Results of Tests 127 and 128.
A. R. Edwards, B. O. Borgartz, R. M. E. Goodman, T. P. O'Brien, and M. Rawlingson. Jun 78, 98p
U.S. Sales Only.

A basic experimental programme involving the sudden depressurisation of a simple pipe system containing water at 3.45 to 17.24MPa pressure and temperature in the range of 200 to 250 exp 0 C has been concluded. Measurements were made of the transient density, pressure, and temperature variations in a two phase fluid in the system during discharge. Phase 1 tests investigated blowdown from straight pipes 4m long with constant internal diameters of 73 and 32 mm. Phase 2 tests incorporated a reservoir added to the 32mm pipe. In this, the second of three reports on Phase 2 tests, the test assembly, instrumentation and experimental procedure are briefly described. The conditions and results are reported for two of the tests in which the liquid in the long discharge pipe was initially subcooled by 10 exp 0 C and 15 exp 0 C while the reservoir was at saturation conditions with a steam dome present. (Atomindex citation 11:546749)

AWRE-44-86-158 PC **A05**/MF **A01**
Ministry of Defence, Foulness (England). Atomic Weapons Research Establishment.
Depressurisation Studies. Phase 2: Results of Tests 119 and 123.
A. R. Edwards, B. O. Borgartz, R. M. E. Goodman, T. P. O'Brien, and M. Rawlingson.
Nov 79, 97p
U.S. Sales Only.

Work has been concluded on a series of tests involving the sudden depressurization of a simple pipe system containing water at pressure of 3.45 to 17.24 MPa and temperatures of 220 to 250 exp 0 C. Measurements were made of the transient density, pressure and temperature variations in a two-phase fluid in the system during discharge. In Phase 2 tests blowdown was investigated from straight pipes 4m long and 32mm dia with a reservoir added. This report is the final of a series of three giving results of tests selected from the Phase 2 series. In these two final tests one was designed to show the effects of a higher initial overpressure and the other to show the influence of a higher initial liquid temperature. (Atomindex citation 11:546750)

BLG-527 PC **A10**/MF **A01**
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
Annual Scientific Report 1978.
J. Proost, R. Billiau, and F. Kirk. 1979, 204p
U.S. Sales Only.

This report of the Centre d'Etude de l'Energie Nucleaire - Studiecentrum voor Kernenergie gives a survey of the scientific and technical work done in 1978. The research areas are: 1. The sodium cooled fast reactor and namely the mixed oxide fuels, the carbide fuel, the materials development, the reprocessing, the fast reactor physics, the safety and instrumentation and the sodium technology. 2. The gas cooled reactors as gas cooled fast and high temperature reactors. 3. The light water reactors namely the BR3 reactor, the light water reactor fuels and the plutonium recycling. 4. The applied nuclear research, waste conditicning and disposal as the safeguards, the fusion research and the lithium technology. 5. The basic and exploratory research namely the materials science and the nuclear physics and finally 6. Non-nuclear research and development such as the air pollution, the pollution abatement and waste handling, the fuel cells and applied electrochemistry. (Atomindex citation 11:532371)

CEA-CONF-4610 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Grenoble (France). Dept. de Metallurgie.

Specific Methods on In-Pile Gammametry.
M. -L. Pointud, and F. Michel. 1979, 13p CONF-7905170-1
In French.Study session on gamma spectrometry, Paris, France, 17 May 1979.
U.S. Sales Only.

The gammametry technique in nuclear research reactors has evolved by the adequation of its means and the quality of its results since its beginnings in 1972. A few specific methods developed for using it in the SILOE reactor of the CEN/G are described. (Atomindex citation 11:526012)

CEA-CONF-4766 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Recherche et Analyse.
Extraction of Insoluble Corrosion Products from the Water Circuits of Nuclear Power Stations by Electromagnetic Filtration.
L. Dolle, P. Grandcollot, J. Chenouard, R. Darras, and P. Beslu. 1979, 12p CONF-790907-2
World Filtration Congress, London, UK, 18 Sep 1979.
U.S. Sales Only.

The separation of insoluble ferromagnetic corrosion products which are in the form of submicronic particles suspended in water at low concentration can proceed at high rate by electromagnetic filtration. At increasing temperatures, but sufficiently below the Curie point of the particles, the efficiency of an electromagnetic filters is considerably improved. The physical characteristics of the filter which exert high influence on its critical filtration rate and its usable capacity are evaluated and taken into account to optimize the controllable operating conditions. Other insoluble corrosion products, non-ferromagnetic in nature, are very efficiently retained in the ferritic slurry. The potential of electromagnetic filter application in the nuclear industry is discussed on the basis of the experimental results obtained from loop tests. (Atomindex citation 11:532042)

CEA-CONF-4773 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services d'Electronique.
Real Time Simulation of a U Tube Steam Generator on a Minicomputer.
G. Zwingelstein, and I. Anastasiou. 1979, 8p CONF-7909147-1
In French.IMACS congress 1979: simulation of systems, Sorrento, Italy, 24 Sep 1979.
U.S. Sales Only.

This paper describes a digital simulation of the dynamic behavior of a U tube steam generator of a pressurized water reactor (PWR). In the first part after a description of the steam generator, a state variable model which represents the dynamic behavior of the plant during small transients is derived from the physical laws. In the second part, the digital simulation code, especially designed to be implemented on a mini computer is developed and the performances are given for a 400 s real time transient. (Atomindex citation 11:525905)

CEA-CONF-4775 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services d'Electronique.
Identification of Multivariate Models for Noise Analysis of Nuclear Plant.
G. C. Zwingelstein, and B. R. Upadhyaya. 1979, 7p CONF-7909155-1
IFAC symposium on identification and system parameter estimation, Darmstadt, F.R. Germany, 24 Sep 1979.
U.S. Sales Only.

During the normal operation of a pressurized water reactor, neutron noise analysis with multivariate autoregressive procedures in a valuable diagnostic tool to extract dynamic characteristics for incipient failure detection. The first part of the paper will describe in details the equations for estimating the multivariate autoregressive model matrices and the structure of various matrices. The matrices are estimated by solving a set of matrix operations, called Yule-Walker equations. The selection of optimal model order will also be discussed. Once the optimal parameter set is obtained, simple and fast calculations are used to determine the auto power spectral density, cross spectra, coherence function, phase. In addition the spectra may be decomposed into components being contributed from different noise sources. An application using neutron flux data collected on a nuclear plant will illustrate the efficiency of the method. (Atomindex citation 11:532056)

CEA-CONF-4810 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses (France). Div. de Chimie.
French Program on Electromagnetic Filtration.
R. Darras, L. Dolle, M. Arod, P. Verdoni, and M. Dubourg. 1979, 2p CONF-790923-11(Sum.)
Decontamination and decommissioning of nuclear facilities conference, Sun Valley, ID, USA, 16 Sep 1979.
U.S. Sales Only.

No abstract available.

CEA-CONF-4816 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Fluid-Structure Interaction: A General Method Used in the CEASEMT Computer Programs.
F. Jeanpierre, R. J. Gibert, A. Hoffmann, and M. Livolant. 1979, 9p CONF-790802-90
International conference on structural mechanics in reactor technology, Berlin, F.R. Germany, 13 Aug 1979.
U.S. Sales Only.

The vibrational characteristics of a structure in air may be considerably modified when the structure is immersed in a dense fluid. Such fluid structure interaction effects are important for the seismic or flow induced vibrational studies of various nuclear equipments, as for example the PWR internals, the fast reactor vessels, heat exchangers and fuel elements. In some simple situations, the fluid effects can be simulated by added masses, but in general, they are much more complicated. A general formulation to calculate precisely the vibrational behaviour of structures containing dense fluids is presented in this paper. That formulation can be easily introduced in finite elements computer codes, the fluid being described by special fluid elements. Its use is in principle limited to the linear range: small movements of structures, small pressure fluctuations. (Atomindex citation 11:525897)

CEA-CONF-4826 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Testing and Analyses of a High Temperature Duct for Gas-Cooled Reactors.
W. E. Black, A. Roberge, P. Felten, and D. Bastien. 1979, 8p CONF-790802-91
International conference on structural mechanics in reactor technology, Berlin, F.R. Germany, 13 Aug 1979.
U.S. Sales Only.

A 0.6 scale model of a steam cycle gas-cooled reactor high temperature duct was tested in a closed loop helium facility. The object of the test series was to determine: 1) the thermal effects of gas permeation within the thermal barrier, 2) the plastic deformation of the metallic components, and 3) the thermal performance of the fibrous insulation. A series of tests was performed with thermal cyclings from 100 exp 0 C to 760 exp 0 C at 50 atmospheres until the system thermal performance had stabilized hence enabling predictions for the reactor life. Additional tests were made to assess permeation by deliberately simulating sealing weld failures thereby allowing gas flow by-pass within the primary thermal barrier. After 100 cycles the entire primary structure was found to have performed without structural failure. Due to high pressures exerted by the insulation on the cover plates and a design oversight, the thin seal sheets were unable to expand in an anticipated manner. Local buckling resulted. The insulation retained an acceptable degree of resiliency. However, some fiber damage was observed within both the high and low temperature insulation blankets. A thermal analysis was conducted to correlate the hot duct heat transfer results with those obtained from the analytical techniques used for the HTGR design using a computer thermal model representative of the duct and test setup. The thermal performance of the insulation, the temperature gradient through the structural components, the heating load to the cooling system and the permeation flow effect on heat transfer were verified. Exellent correlation between the experimental data and the analytical techniques were obtained. (Atomindex citation 11:525908)

CEA-CONF-4859 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services d'Electronique.
Review of Some Problems Encountered with In-Core Fission Chambers and Self-Powered Neutron Detectors in PWR'S. Tests - Present Use - Outlook on the Near Future.
J. Duchene, and R. Verdant. 1979, 31p CONF-7910169-1
In French.French-Soviet seminar on in-service inspection of the reactor core and instrumentation of PWR, Moscow, USSR, 8 Oct 1979.
U.S. Sales Only.

The working conditions of in-core detectors are investigated as well as some reliability problems which depend on nuclear environment (such as decrease of sensibility, loss of insulation...). The long-term irradiation tests in experimental reactor that have been carried out by the CEA these last years, with fission chambers (FC) and Self-Powered Detectors (SPD), are described. The travelling probe system with moveable FC used in the 900 MWe PWR is briefly described. Finally an outlook on future possibilities is given; for instance the use of fixed SPD and a moveable FC in the same thimble, allowing recalibration of the fixed detectors. (Atomindex citation 11:525971)

CEA-CONF-5056 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Cadarache, Saint-Paul-les-Durance (France). Dept. des Reacteurs a Neutrons Rapides.
Calculations of the Loss of Flow Accident in Large LMFBR: Influence of Core Parameters.
Y. Balloffet, R. de Fremont, F. Josso, D. de Lapparent, and R. Rossignol. 1979, 10p CONF-790816-92
International meeting on fast reactor safety technology, Seattle, WA, USA, 19 Aug 1979.
U.S. Sales Only.

When comparing the behaviors of a heterogeneous core configuration and a homogeneous core configuration of a large LMFBR subject to a LOF type HCDA, it is necessary to understand the influence of many different core parameters. The results are presented of the comparative calculations made with the SURDYN code, up to the end of the primary power excursion. They show that, if sodium does boil, the energy yield is larger with the heterogeneous core, but the preboiling time is then longer. Parametric calculations, with gradual modifications from the homogeneous core to the heterogeneous core, show that the power and temperature distribution and, to a smaller extent, the fuel reactivity feedback, are the main contributors. Doppler and void coefficients (somewhat smaller in the heterogeneous core) have less influence. (Atomindex citation 11:546742)

CEGB-RD/B/N-4661 PC **A03**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
Computer Model for Predicting Particulate Transport in Reactor Coolant Geometries.
M. W. Reeks. Oct 79, 28p
U.S. Sales Only.

A computer mode is described which is based on the statistical simulation of particle motion in a random velocity field, for use in predicting particulate deposition in complex reactor coolant geometries. The model uses a finite element procedure based on the BERGEN mesh generation program for discretising a bounded continuum and a particle equation of motion based on quasi-steady drag. Two applications of the model are described:-(1) Statistical motion of particles in the entrance region of a central inertial collector (CIC), and (2) Statistical motion in an in-line array of boiler tubes. (Atomindex citation 11:525914)

DOE/ER/04014-10 PC **A02**/MF **A01**
Florida Univ., Gainesville. Dept. of Nuclear Engineering Sciences.

Annual Progress Report of the University of Florida Training Reactor September 1, 1979-August 31, 1980.
N. J. Diaz. Nov 80, 24p
Contract AC05-76ER04014

Reported are: reactor operation, modifications, maintenance and tests, changes to technical specifications and standard operating procedures, radioactive releases and environmental surveillance, and training utilization. (ERA citation 06:007756)

EPRI-NP-1615 PC **A08**/MF **A01**
Argonne National Lab., IL.
Core Restraint and Seismic Analysis of a Large Heterogeneous Free-Flowering Core Design. Final Report.
J. T. Madell, T. J. Moran, J. E. Ash, and P. J. Fulford. Nov 80, 153p
Contract W-31-109-ENG-38

The core restraint and seismic performance of a large heterogeneous core was analyzed. A free-flowering core restraint system was selected for this study, as opposed to the limited-free bow system of the FFTF and CRBRP. The key features of the core restraint system, such as stiff reflector assemblies and load pad properties, were specified in this study. Other features - such as the fuel-assembly description, flux and temperature distributions, and clearances between the assembly nozzle and grid plate - were obtained from the other parts of a large, heterogeneous Core Study 11 and 12. Core restraint analysis was performed with NUBOW-3D over the first two cycles of operation. The SCRAP code was used to analyze the time-history seismic response of the core with the effects of fluid, impact, and bowed assemblies modeled in the code. The core restraint system design was assessed in terms of the predicted forces, impacts, displacements, and reactivity effects for different cycle times and power/flow ratios. (ERA citation 06:006052)

GKSS-79/E/49 PC **A05**/MF **A01**
GKSS - Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)
Multiple-Vent Programme to Test the Pressure Suppression System. Summary of the Preliminary Test Results.
E. Aust, H. Schwan, and I. Vollbrandt. 1979, 76p
In German.
U.S. Sales Only.

Three pre-tests with a multiple vent configuration have been performed at the GKSS pressure suppression test facility. First test results indicate significant chugging events with occur periodically with 0.4 to 0.2 Hz. These events appear simultaneously in less than 10 ms at the exit of the three vent pipes and cause pressure pulses in the range of 3 bar. This report gives a short description of the test facility and presents the boundary conditions of the test facility and presents the boundary conditions of the three pre-tests, test results and a first valuation of the experimental informations. (Atomindex citation 11:546741)

GRS-F-88 PC **A99**/MF **A01**
Gesellschaft fuer Reaktorsicherheit m.b.H., Cologne (Germany, F.R.).
Progress Report Projects in the Field of Nuclear Safety Sponsered by the Federal Minister for Research and Technology. Period under Report: October 1-December 31, 1979.
Mar 80, 665p
In German.
U.S. Sales Only.

Investigations on the safety of Light Water Reactors (LWR) being performed in the framework of the Research Program Reactor Safety (RS-Projects) are sponsored by the BMFT (Federal Minister for Research and Technology), Bundesminister fuer Forschung und Technologie. Objective of this program is to investigate in greater detail the safety margins of nuclear energy plants and their systems and the further development of safety technology. Besides the investigations of LWR tasks, first projects on the safety of FBR type reactors are sponsored by the BMFT. The GRS (Reactor Safety Association), Gesellschaft fuer Reaktorsicherheit mbH, by order of the BMFT, informs continuously of the status of such investigations by means of quarterly and annually publication of progress reports within the series GRS-F-Fortschrittsberichte (GRS-F-Progress Reports). Each progress report represents a compilation of individual reports about objectives, the work performed, the results, the next steps of the work etc. (Atomindex citation 11:546753)

HEDL-SA-2183-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Contamination Transport in the Primary Coolant System During a Breached Fuel Pin Test in EBR-II.
R. P. Colburn, and H. P. Maffei. Nov 80, 14p
CONF-801107-57
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

The release and transport behavior of contaminants can be interpreted in terms of two basic mechanisms: particulate entrainment and solution of volatile, short-lived precursors. Examination of the sampler indicates that for U, Pu, exp 95 Zr-Nb, exp 103 Ru, exp 106 Ru, exp 144 Ce, and exp 154 Eu particulate entrainment was the dominant mechanism in this test. The distributions of exp 141 Ce and exp 140 Ba-La deposits indicated both mechanisms were significant in the transport of these species. (ERA citation 06:006053)

IAE-3087 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Technique for Calculation of Nonstationary Regimes of NPP with WWER Type Reactor.
A. I. Mysenkov. 1979, 24p
In Russian.
U.S. Sales Only.

Described is the calculation technique of nonstationary (emergency) regimes of atom steam producing plants (ASPP) with a WWER-type reactor. The processes in the first and the second circuits and the operation of the system of automatic regulation (SAR) are considered. SAR comprises the automatic regulator of the reactor yield, reactor emergency safety, volume compensator automatics and steam generators. For thermohydraulic calculation of transient processes in nuclear power plant the following main equations are continuity equation, equations of motion, energy, state and heat conductivity. A concrete form of these equations for main elements of ASPP and the way of its volution are described. Equations of neutron kinetics in point approximation are used to determine the energy liberation in the reactor core. It is considered that energy liberation is proportional to the neutron density. A calculated program MOST-7 is made on the basis of the given technique. (Atomindex citation 11:525898)

IEA-DT-047 PC **A05**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Control-and-Instrumentation System of the IEA Zero Power Reactor and Its Reliability Calculation.
M. A. V. Peluso. Mar 78, 85p
In Portuguese.Thesis.
U.S. Sales Only.

The control-and instrumentation system for the Instituto de Energia Atomica Zero Power Reactor is described and the design criteria are presented and discussed. The reliability analysis for the reactor protection system was performed using the fault tree method. This was done using a computer code based on the Monte Carlo simulation. That code is an adaptation of the SAFTE-I, for the IBM 360/155 IEA Computer. (Atomindex citation 11:552823)

IEA-DT-142 PC **A04**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Calculation of the Optimum Fuel Distribution Which Maximizes the Power Output of a Reactor.
W. N. dos Santos. Aug 79, 52p
In Portuguese.Thesis.
U.S. Sales Only.

Using optimal control techniques, the optimum fuel distribution - which maximizes the power output of a thermal reactor - is obtained. The nuclear reactor is described by a diffusion theory model with four energy groups and by assuming plane geometry. Since the analytical solution is impracticable, by using a perturbation method, a FORTRAN program was written, in order to obtain the numerical solution. Numerical results, for a thermal reactor light water moderated, non reflected, are shown. The fissile fuel material considered is Uranium-235. (Atomindex citation 11:552778)

IHZ-R-79-353 PC **A03**/MF **A01**
Zentralinstitut fuer Schweisstechnik, Halle (German D.R.).
Title List of Selected Soviet Reports in the Fields of Nuclear Research and Nuclear Engineering. 12.
G. Schumann, and R. Sube. Dec 79, 48p
In German.
U.S. Sales Only.

136 titles of reports issued by Soviet institutes (KFTI, EFI, IAE, IFVE, ITEF, NIIAR, NIIEFA, FEI, RI, SFTI) in the fields of nuclear research and nuclear engineering have been arranged according to the INIS subject scope. The reports are available on a loan basis from ZfK Rossendorf, Information Department, Dresden. (Atomindex citation 11:553199)

IHZ-R-79-354 PC **A03**/MF **A01**
Zentralinstitut fuer Schweisstechnik, Halle (German D.R.).
Title List of Selected Soviet Reports in the Fields of Nuclear Research and Nuclear Engineering. 13.
G. Schumann, and R. Sube. Dec 79, 41p
In German.
U.S. Sales Only.

136 titles of reports issued by Soviet institutes (KFTI, EFI, IAE, IFVE, ITEF, NIIAR, NIIEFA, FEI, RI, SFTI) in the fields of nuclear research and nuclear engineering have been arranged according to the INIS subject scope. The reports are available on a loan basis from ZfK Rossendorf, Information Department, Dresden. (Atomindex citation 11:553200)

INIS-mf-5741 PC **A07**/MF **A01**
Gesellschaft fuer Reaktorsicherheit m.b.H., Cologne (Germany, F.R.).
Analysis of LOCA Today. The LOFT Tests and Their Consequences.
1979, 134p CONF-791124-
GRS-Fachgesprach, Munich, F.R. Germany, 30 Nov 1979.
U.S. Sales Only.

A separate abstract was prepared for each paper. (Atomindex citation 11:529345)

INIS-mf-6038 PC **A09**/MF **A01**
Instituto Militar de Engenharia, Rio de Janeiro (Brazil).
Code for the Core Simulation in Pressurized Water Reactors.
M. A. B. Serrano. Aug 78, 182p
In Portuguese.Thesis.
U.S. Sales Only.

A computer code was developed for the simulation of the steady-state and transient behaviour of the average channel of a Pressurizer Water Reactor core. Point kinetics equations were used with the reactivity calculated for average temperatures in the channel with the fuel and moderator temperature feedbacks. The radial heat conduction equation in the fuel was solved numericaly. For calculating the thermodynamic properties of the coolant, the fundamental equations of conservation (mass, energy and momentum) were solved. The gap and clad were treated as a resistence added to the film coeficient. The fuel system equations were decoupled from the coolant equations. The program permitted the changes in the heat transfer correlations and the flow patterns along the coolant channel. Various test were performed to determine the steady-state and transient response employing the PWR core simulator developed, obtaining results with adequate precision. (Atomindex citation 11:552779)

INIS-mf-6039 PC **A05**/MF **A01**
Instituto Militar de Engenharia, Rio de Janeiro (Brazil).
Non-Linear Punctual Kinetics Applied to PWR Reactors Simulation.
F. S. Cysne. Nov 78, 79p
In Portuguese.Thesis.
U.S. Sales Only.

In order to study some kinds of nuclear reactor accidents, a simulation is made using the punctual kinetics model for the reactor core. The following integration methods are used: Hansen's method in which a linearization is made and CSMP using a variable interval fourth-order Runge Kutta method. The results were good and were compared with those obtained by the code Dinamica I which uses a finite difference integration method of backward kind. (Atomindex citation 11:552771)

Juel-Spez-53 PC **A07**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung.
Constructive and Thermal Design of a Core Fast Discharge. A Contribution for the after-Heat Removal of High-Temperature Reactors.
H. Schroer. Aug 79, 128p
In German.Thesis.
U.S. Sales Only.

The present study is concerned with the development and thermal design of a fast discharge system for balls for the PR 3000 MWsub(th) process heat reactor. The term 'fast discharge system for balls' denotes a very short-time discharge procedure of the entire core contents, i.e. the flowing out of the fuel elements due to gravity into a receiver tank underneath the prestressed-concrete vessel. From a safety-engineering point of view, the fast discharge system for balls constitutes an additional possibility of active decay heat removal, besides the multiply redundant and diversitary reactor protection system, serving to further reduce the remaining residual risk. A fast discharge system for balls, however, is to be used only in the event of all the other possibilities of active decay heat removal having failed and when the maximum permissible temperatures for particularly exposed primary circuit components have been reached. However, the application range of such a system is restricted exclusively to high-temperature reactors with spherical fuel elements; the procedure cannot be applied to other reactor systems because of the rigidly fixed position of the fuel elements inside the core and for reasons of fuel element geometry. Besides the purpose of application, the influence of in-core temperature development on the possible actuation of the fast discharge system is being described in particular detail. This is followed by a description of the structural and thermal design of three specific major components, i.e. the piping system, shut-off devices and fuel element receiver tank, which will have to be installed additionally for the implementation of a fast discharge system for balls as compared to previous plant concepts. (Atomindex citation 11:532064)

JAERI-M-8064 PC **A15**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Back Up Core Designs for the Experimental Multi-Purpose VHTR. Determination of Fuels and Core Design Parameters.
T. Aochi, T. Yasuno, Y. Miyamoto, Ryuichi Shindo, and T. Ikushima. Feb 79, 332p
In Japanese.
U.S. Sales Only.

For the Experimental Multi-Purpose Very High Temperature Reactor (thermal power 50 MW and reactor outlet helium temperature 1000 exp 0 C), design studies have been made of two backup cores loaded with new-type fuel elements. The purpose is to improve core operational characteristics, especially in thermohydraulics, of the reference design core consisting of pin-in-block type fuel elements having externally cooled hollow fuel rods. In this report are described the design principles and the analyses made of nuclear, thermal and hydraulic, fuel, and safety performances to determine the backup fuel and core design parameters. The first backup core (SP fuel core) is composed of fuel elements with internally cooled fuel rods (semi-pin), 36 rods in each standard element and 18 rods in each control element. The second backup core (MH fuel core) is composed of multi-hole fuel elements. 102 fuel and 54 coolant holes in each standard element and 30 fuel and 18 coolant holes in each control element. Either of the cores has 73 fuel columns 4 m high; the arrangement of active core and reactor internal structures is the same as that in the reference design. The backup cores meet nearly all design requirements of the VHTR, permitting the rated power operation with coolant Reynolds number of over 10,000 in the SP core and over 6,000 in the MH core. (Atomindex citation 11:525907)

JAERI-M-8089 PC **A09**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Report on Operation, Utilization and Technical Development of Research Reactors and Hot Laboratory. April 1, 1977 to March 31, 1978.
Mar 79, 187p
In Japanese.
U.S. Sales Only.

Activities of the Division of Research Reactor Operation in fiscal 1977 are described. The division is responsible for operation and maintenance of JRR-2, JRR-3, JRR-4 and Hot Laboratory. In the above connection, various other works are performed, including technical management of fuel and coolant, radiation control, irradiation technique, etc. In Hot Laboratory, post irradiation examinations of fuels and materials are made, and also development of examination methods. (Atomindex citation 11:525941)

JAERI-M-8169 PC **A16**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Data Report on Reflood Experiment, 8. Series 6, Heat Transfer Data.
J. Sugimoto, Yoshio Murao, Tadashi Iguchi, Takashi Sudoh, and Yukio Sudo. Mar 79, 369p
In Japanese.
U.S. Sales Only.

Heat transfer behavior in series 6 reflood experiment is reported including test conditions and data processing. To develop an analysis code, the purpose of the series 6 reflood experiment was as follows: (1) Overall reflood phenomena in a 4 x 4 array indirectly heated heater rod bundle. Sheathed thermocouples were completely embedded in the heater rod cladding. (2) Quench characteristics at low flooding rate. (3) Differential pressure response in the core. (4) Heat transfer coefficients downstream of the quench point. (5) Water effluence behavior at outlet of the core. (6) Effect of non-heated rod in the core. (7) System response under intermittent-flow-rate core forced injection. The tests were in three groups according to the water injection methods to the core: (1) Constant-flow-rate core forced injection, (2) intermittent-flow-rate core forced injection, and (3) system effect test. (Atomindex citation 11:525903)

JAERI-M-8309 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Design Studies on Make-Up and Purification Systems of the Helium Engineering Demonstration Loop (HENDEL).
H. Tone, S. Negoya, Y. Ouchi, H. Simomura, and T. Tanaka. Jul 79, 73p
In Japanese.
U.S. Sales Only.

For completion at the end of 1980, HENDEL (Helium Engineering Demonstration Loop) is now under design and construction, which will be used to confirm performances of VHTR core components, intermadiate heat exchanger and high temperature piping. Before beginning the final design of the HENDEL system and components, basic manufacture designs were made of its M sub 1 and M sub 2 loops, adapter, test sections, make-up system (Mu), helium purification system (Mp), instruments and utilities. Executing the basic manufacture designs, important elements for the designs such as arrangement, component parts, design data, mass and heat balances have been studied. In this report, results of the studies on the basic designs of make-up and purification systems are described. Similar results for other than these systems will be described separately in later reports. (Atomindex citation 11:525915)

JAERI-M-8354 PC **A05**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Operating Function Tests of the PWR Type RHR Pump for Engineering Safety System under Simulated Strong Ground Excitation.
T. Uga, K. Shiraki, T. Homma, H. Inazuka, and N. Nakajima. Aug 79, 81p
U.S. Sales Only.

Results are described of operating function verification tests of a PWR RHR pump during an earthquake. Of the active reactor components, the PWR residual heat removal pump was chosen from view points of aseismic classification, safety function, structural complexity and past aseismic tests. Through survey of the service conditions and structure of this pump, seismic test conditions such as acceleration level, simulated seismic wave form and earthquake duration were decided for seismicity of the operating pump. Then, plans were prepared to evaluate vibration chracteristics of the pump and to estimate its aseismic design margins. Subsequently, test facility and instrumentation system were designed and constructed. Experimental results could thus be acquired on vibration characteristics of the pump and its dynamic behavior during different kinds and levels of simulated earthquake. In conclusion: (1) Stiffeners attached to the auxiliary system piping do improve aseismic performance of the pump. (2) The rotor-shaft-bearing system is secure unless it is subjected to transient disturbunces having high frequency content. (3) The motor and pump casing having resonance frequencies much higher than frequency content of the seismic wave show only small amplifications. (4) The RHR pump possesses an aseismic design margin more than 2.6 times the expected ultimate earthquake on design basis. (Atomindex citation 11:525904)

KAERI-189/RR-58/79 PC **A05**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Stress Analysis of Pressure Vessels.
B. K. Kim, D. H. Song, K. H. Son, K. S. Kim, and K. B. Park. 1979, 78p
In Korean.
U.S. Sales Only.

This interim report contains the results of the effort to establish the stress report preparation capability under the research project "Stress analysis of pressure vessels." 1978 was the first year in this effort to lay the foundation through the acquisition of SAP V structural analysis code and a graphic terminal system for improved efficiency of using such code. Software programming work was developed in pre- and post processing, such as graphic presentation of input FEM mesh geometry and output deformation or mode shope patterns, which was proven to be useful when using the FEM computer code. Also, a scheme to apply fracture mechanics concept was developed in fatigue analysis of pressure vessels. (Atomindex citation 11:549237)

KAERI-190/RR-59/79 PC **A04**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Design and Analysis of Pressurized Water Reactor Systems.
P. E. Juhn, and Y. H. Kim. 1979, 63p
In Korean.
U.S. Sales Only.

To help develop nuclear engineering technologies in local industry sectors, technical and economical data on pressurized water reactor systems and components have been collected, systematically analyzed and computerized to a certain degree. Codes and standards necessary for engineering design of PWR systems have been surveyed and clarified in terms of NSSS, turbine-generator system and BOP, then again rearranged with respect to quality classes and seismic classes. Some design manuals, criteria and guidelines regarding design, construction, test and operation of PWR plants have also been surveyed and collected. Benchmark cost calculation for the construction of a 900 MWe PWR plant, according to the standard format, was carried out, and computer model on construction costs was improved and updated by considering the local supply of labor and materials. And for the indigeneous development of PWR equipment and materials, such data as delivery schedule and manufacturers of 52 systems and 36,000 components have also been reviewed herein. (Atomindex citation 11:549306)

KAERI-194/RR-63/79 PC **A05**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Nuclear Core Design.
M. Cho, J. D. Kim, and W. K. Hwang. 1979, 77p
In Korean.
U.S. Sales Only.

In-core power distribution of Kori nuclear power plant unit 1 is calculated by NUSIM-3 whose inputs are prepared by means of NUMICE, CITATION, FOG and THERMO. Using 3-D nodal code NUSIM-3, the critical soluble boron concentration letdown and the change of power distribution are obtained at every 2,000 MWD/MTU burn-up step from 0 MWD/MTU to 14,600 MWD/MTU and the results are reviewed according to the design value of Kori FSAR. Additionally, through GGC-4 and THERMOS-MUG code, the calculation of multigroup constant in each region of TRIGA Mark-III is performed to analyse the power characteristics and critical point of initial core. (Atomindex citation 11:549233)

KAERI-199/RR-68/79 PC **A03**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Seismic Testing of Wolsung-1 Steam Generator Models.
B. K. Kim, D. H. Choi, S. H. Park, and I. K. Kim. 1979, 45p
In Korean.
U.S. Sales Only.

This 1978 annual report contains the results of "Seismic testing of Wolsung-1 steam generator model" which was initiated in 1977 as a part of a study on nuclear components testing. Model 78, improved version of Model 77 which did not take into account for internal masses, ws fabricated for dynamic testing (natural frequencies, mode shapes, damping factors determination). Test results show close correlation with the FEM model. However, the second and third natural frequencies of Model 78 were off as much as 16% due to geometric discontrinuity of the model. The discrepancy can be overcome by dose simulation of the discontinuity in the analysis. Close resemblance of the mode shapes of Model 77 and Model 78 justified the dynamic simulation of Model 78 using simpler geometry. (Atomindex citation 11:549238)

KAERI-218/RR-87/79 PC **A04**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Experimental Study of Emergency Core Cooling.
Y. W. Lee, M. K. Chung, S. H. Lee, H. Y. Nam, and S. Y. Won. 1979, 72p
In Korean.
U.S. Sales Only.

Understanding the reflooding phenomena occurring during a loss-of-coolant accident(LOCA) is important for the performance evaluation of the emergency core cooling system(ECCS). This report describe the results of experimental investigation designed to predict emergency core cooling transients in bottom flooding condition following a loss of coolant accident. Reflooding experiments have been performed with a circular tube, 180cm in length and directly heated with a range of experimental conditions (Wall temperature 300-800 exp 0 C, Coolant flooding rate 5-30cm/sec, subcooling 35-85 exp 0 C). The results show that the rewetting velocity depends upon the wall temperature of the test section, coolant flow rate, and subcooling. The one-dimensional heat-conduction equation was developed to predict the rewetting velocity in a heated tube. (Atomindex citation 11:549240)

KAERI-235/RR-104/79 PC **A04**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Water Chemistry of Kori Nuclear Power Plant.
K. R. Yang, I. J. Lee, and T. W. Suk. 1979, 52p
In Korean.
U.S. Sales Only.

An analysis and investigation were performed on the data connected with water quality control at Kori No. 1 plant, during commercial operation, from Apr. to Oct. 1978. Contents of ammonia contained in steam generator samples in Apr. and Sep. were exceeding the control value recommended by Westingouse, but contents of another analysis items were satisfied with Westinghouse's value. Ammonia being determental to materials of PWR is produced by thermal decomposition of hydrazine added in order to decrease dissolved oxygen. Therefore, the factors considered to minimize dissolved oxygen content as well as behaviour of ammonia in secondary coolant were investigated. Furthermore, brief discussion was made on establishing of polishing plant, establishment of water analysis method, establishing of on-line recorder and its normal operation to control water quality efficiently, and designs for construction of autoclave and pot boiler to study corrosion phenomena. (Atomindex citation 11:549250)

KFK-2953 PC **A03**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Schneller Brueter.
Model of Gas Cavity Breakup Behind a Blockage in Fast Breeder Reactor Subassembly Geometry.
Y. Fukuzawa. May 80, 46p
U.S. Sales Only.

A semi-empirical model has been developed to describe the transient behaviour of a gas cavity due to breakup behind a blockage in Liquid Metal Fast Breeder Reactor subassembly geometry. The main mechanisms assumed for gas cavity breakup in the present model are as follows: The gas cavity is broken up by the pressure fluctuation at the interface due to turbulence in the liquid. The centrifugal force on the liquid opposes breakup. The model is able to describe experimental results on the transient behaviour of a gas cavity due to breakup after the termination of gas injection. On the basis of the present model the residence time of a gas cavity behind a blockage in sodium is predicted and the dependence of the residence time on blockage size is discussed. (Atomindex citation 11:552890)

KFK-2954 PC **A06**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Schneller Brueter.
Heat Transfer Near Spacer Grids in Gas-Cooled Rod Bundles.
A. Hassan. May 80, 118p
In German.Thesis.
U.S. Sales Only.

The influence of spacer grids on heat transfer in gas-cooled rod bundles was experimentally determined for the first time over a wide range of parameters. The experimental investigations were carried out with a smooth and a rough rod bundle for Reynolds-numbers between 600 and 2 x 10 exp 5 . The measured range covered the transition from laminar to turbulent, the transition from hydraulic smooth to rough and fully rough flow. By gas cooling, artificial roughnesses are used on the rod surfaces to disturb the viscous sublayer, which acts as an insulator because of the low thermal conductivity of gases. For this investigation, a two-dimensional rectangular roughness was used, which had an optimal heat transfer characteristic. (Atomindex citation 11:549337)

LBL-11027 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Development of Electro-Optical Instrumentation for Reactor Safety Studies.
B. T. Turko, W. F. Kolbe, B. Leskovar, and R. K. Sun. Nov 80, 13p CONF-801103-35
Contract W-7405-ENG-48
IEEE nuclear science symposium, Orlando, FL, USA, 5 Nov 1980.

The development of new electro-optical instrumentation for reactor safety studies is described. The system measures the thickness of the water film and droplet size and velocity distributions which would be encountered in the annular two-phase flow in a reactor cooling system. The water film thickness is measured by a specially designed capacitance system with a short time constant. Water droplet size and velocity are measured by a subsystem consisting of a continuously pulsed laser light source, a vidicon camera, a video recorder, and an automatic image analyzer. An endoscope system attached to the video camera is used to image the droplets. Each frame is strobed with two accurately spaced uv light pulses, from two sequentially fired nitrogen lasers. The images are stored in the video disk recorder. The modified automatic image analyzer is programmed to digitize the droplet size and velocity distributions. Many special optical, mechanical and electronic system components were designed and fabricated. They are described in detail, together with calibration charts and experimental results. (ERA citation 06:006092)

ND-R-364(S) PC **A02**/MF **A01**
UKAEA, Risley (England). Nuclear Power Development Establishment.
Zircaloy PWR Fuel Cladding Deformation Tests under Mainly Convective Cooling Conditions.
E. D. Hindle, and C. A. Mann. Jan 80, 24p
U.S. Sales Only.

In a loss-of-coolant accident the temperature of the cladding of the fuel rods may rise to levels (650-810 exp 0 C) where the ductility of Zircaloy is high (approximately 80%). The net outward pressure which will obtain if the coolant pressure falls to a small fraction of its normal working value produces stresses in the cladding which can result in large strain through secondary creep. An earlier study of the deformation of specimens of PWR Zircaloy cladding tubing 450 mm long under internal pressure had shown that strains of over 50% could be produced over considerable lengths (greater than twenty tube diameters). Extended deformation of this sort might be unacceptable if it occurred in a fuel element. The previous tests had been carried out under conditions of uniform radiative heat loss, and the work reported here extends the study to conditions of mainly convective heat loss believed to be more representative of a fuel element following a loss of coolant. Zircaloy-4 cladding specimens 450 mm long were filled with alumina pellets and tested at temperatures between 630 and 845 exp 0 C in flowing steam at atmospheric pressure. Internal test pressures were in the range 2.9-11.0 MPa (400-1600 1b/in exp 2). Maximum strains were observed of the same magnitude as those seen in the previous tests, but the shape of the deformation differed; in these tests the deformation progressively increased in the direction of the steam flow. These results are compared with those from multi-rod tests elsewhere, and it is suggested that heat transfer has a dominant effect in determining deformation. The implications for the behaviour of fuel elements in a loss-of-coolant accident are outlined. (Atomindex citation 11:525896)

NIIAR-45(404) PC **A02**/MF **A01**
Nauchno-Issledovatel'skii Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR).
Techniques for the Thermalhydraulic Calculations of Core and Draught Zone in a Tank Type Boiling Water Reactor with Natural Circulation.
A. I. Gavrilin, V. I. Gorburov, V. N. Fedulin, and A. V. Abasov. 1979, 23p
In Russian.
U.S. Sales Only.

The choice of the techniques used for the thermohydraulic calculations of the fuel assemblies, the core and the draught section of the tank-type boiling water reactor has been based on a comparative analysis of calculation results and experiments run on testing facilities and the experimental-commercial boiling water reactor VK-50. The subchannel method and test-based recommendations to calculations of a heat-mass exchange between the assembly subchannels (channels) have been used in the fuel assembly calculations. It is shown that the subchannel method application permits to determine more in detail compared to other methods the coolant radial and axial distribution in fuel assemblies as well as to specify the averaged values of certain parameters. (Atomindex citation 11:532018)

ORNL/CSD/TM-135 PC **A03**/MF **A01**
Union Carbide Corp., Oak Ridge, TN. Nuclear Div.
Light Water Reactor-Pressure Vessel Surveillance Project Computer System.
S. H. Merriman. Oct 80, 47p
Contract W-7405-ENG-26

A dedicated process control computer has been implemented for regulating the metallurgical Pressure Vessel Wall Benchmark Facility (PSF) at the Oak Ridge Research Reactor. The purpose of the PSF is to provide reliable standards and methods by which to judge the radiation damage to reactor pressure vessel specimens. Benchmark data gathered from the PSF will be used to improve and standardize procedures for assessing the remain-

ing safe operating lifetime of aging reactors. The computer system controls the pressure vessel specimen environment in the presence of gamma heating so that in-vessel conditions are simulated. Instrumented irradiation capsules, in which the specimens are housed, contain temperature sensors and electrical heaters. The computer system regulates the amount of power delivered to the electrical heaters based on the temperature distribution within the capsules. Time-temperature profiles are recorded along with reactor conditions for later correlation with specimen metallurgical changes. (ERA citation 06:006070)

ORNL/TM-7522 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Bulk Shielding Facility Quarterly Report January-March 1980.
S. S. Hurt, E. D. Lance, and J. R. Thomas. Dec 80, 28p
Contract W-7405-ENG-26

The BSR operated at an average power level of 1967 kW for 75.38% of the time during January, February, and March. Water-quality control in both the reactor primary and secondary cooling systems was satisfactory. The PCA (Pool Critical Assembly) was used in training programs and was operated on fifteen occasions. Nuclear engineering students from the University of Tennessee, Louisiana State University, and Mississippi State University actively participated in training laboratories. The PCA was also operated on five occasions for the Pressure Vessel Simulator Benchmark experiment. (ERA citation 06:007758)

PTB-FMRB-76 PC **A03**/MF **A01**
Physikalisch-Technische Bundesanstalt, Brunswick (Germany, F.R.). Forschungs- und Messreaktor.
Report on Activities in the Forschungs- und Messreaktor Braunschweig (FMRB) For the Year 1978.
H. J. Kriks, and W. Vorbrugg. Oct 79, 49p
In German.
U.S. Sales Only.

In 1978 the Forschungs- und Messreaktor Braunschweig (FMRB) has been in action for 3129 hours without any serious disturbance. The experience in the field of reactor operation, in the radiation protection work as well as in the experiments at the beam tubes is reported. (orig.) 891 RW/orig. 892 AMO. (Atomindex citation 11:525942)

RRC-34 PC **A03**/MF **A01**
Reactor Research Centre, Kalpakkam (India).
Techniques for Extinguishing Sodium Fires.
C. Raju, and R. D. Kale. Feb 79, 46p
U.S. Sales Only.

The experimental work done to evaluate the performance of commercially available fire extinguishants and powders for sodium fires is describec. Dry chemical powder with sodium bicarbonate base was found very effective. Another effective method of extinghishing fire by using perforated covered tray is also discussed. (Atomindex citation 11:552908)

18J. Reactor Materials

BLG-530 PC **A02**/MF **A01**
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
Zircaloy-4 Clad UO sub 2 Fuel Elements Irradiation to a Burn-Up of 7,500 MWd/TU.
G. Horhoianu, J. vad de Velde, and G. van Loon. Jan 80, 8p
U.S. Sales Only.

Six Zircaloy-4 clad uranium oxide elements have been irradiated in the pressurized capsules of the BR2 reactor. All elements were intact up to the end of the test. Final dimensions of the elements remained almost unchanged compared to the preirradiation measurements. Changes in UO sub 2 fuel microstructure were not observed. Discrete UO sub 2 particles have been seen in the fuel pellets. The amounts of released fission gas are small. The ZrO sub 2 film on the outside of the cladding was thicker and more uniform than on the inside. The ultimate tensile strength of the irradiated Zircaloy had increased with 90% while the elongation was reduced to 72%. (Atomindex citation 11:532113)

CEA-CONF-4765 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Technologie.
Different Types of Behavior of Failed Fuel Elements in Experimental Water Cooled Reactors. Operation and Examination after Irradiation.
B. Houdaille, R. Atabek, and G. de Contenson. 1979, 15p CONF-790935-4
In French.IAEA specialists meeting on defected zirconium alloy clad ceramic fuel in water cooled reactors, Chalk River, Canada, 17 Sep 1979.
U.S. Sales Only.

This report is a survey of data collected from the analysis of cladding failures on PWR elements of various origins, brought about accidentally or deliberately during loop or experimental channel irradiations. Two main types of cladding degradation have been observed: by internal corrosion occurring either as a result of prolonged operation with cyclings or if the water inlet is located at the level of the UO sub 2 column; by external corrosion following a build-up of deposits on the cladding under working conditions of high thermal flux, slow coolant flow and unfavourable water chemistry. In the experimental power reactors, the cladding failures due to internal corrosion affected a very small number of pins (1st core) and the irradiation could be continued. External corrosion, on the other hand, involved a large number of 2nd core pins and led to reactor shut-down. However the fuel elements coated with deposits, were reloaded and worked without further degradation up to 35,000 MWd/t. (Atomindex citation 11:532047)

CONF-801229-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Recovery of Uranium from Seawater-Status of Technology and Needed Future Research and Development.
A. D. Kelmers. 1980, 10p
Contract W-7405-ENG-26
Topical meeting: the recovery of uranium from sea water, Cambridge, MA, USA, 1 Dec 1980.

A survey of recent publications concerning uranium recovery from seawater shows that considerable experimental work in this area is currently under way in Japan, less in European countries. Repeated screening programs have identified hydrous titanium oxide as the most promising candidate adsorbent; however, many of its properties, such as distribution coefficient, selectivity, loading, and possibly stability, appear to fall far short of those required for a practical recovery system. In addition, various evaluations of the energy efficiency of pumped or tidal power schemes for contacting the sorbent and seawater are in serious disagreement. Needed future research and development tasks have been identified. A fundamental development program to achieve significantly improved adsorbent properties would be required to permit economical recovery of uranium from seawater. Unresolved engineering aspects of such recovery systems are also identified and discussed. 63 references. (ERA citation 06:005796)

DOE/SR-SF-2005-11 PC **A06**/MF **A01**
Department of Energy, Aiken, SC. Savannah River Operations Office.
Monthly Away-from-Reactor Spent Fuel Storage Report: AFR Program, November 1-30, 1980.
1980, 124p

The work breakdown structure (WBS) of the Away-From-Reactor spent fuel storage program (AFR) has the following major tasks: planning and management, facility acquisition, legislative requirements, technical support, transportation, and international activities. Each task has several subtasks or activities which are covered in this report. Section 1 is a summary of monthly activities and section 2 gives the objective and status of each active subtask and includes work and milestone charts. A glossary of AFR acronyms is included. (ERA citation 06:007001)

FEI-962 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Obninsk. Fiziko-Energeticheskii Inst.
Hydrodynamic Inertness and Vibration Damping of Pin-Type Elements and Shells in Restricted Liquid-Filled Volumes.
V. S. Fedotovskii. 1979, 20p
In Russian.
U.S. Sales Only.

Considered are oscillations of round cylindrical rods in a rigid eccentric shell filled with a liquid. Nonlinearities of an added mass and hydrodynamic damping are determined. Small advance and rotational oscillations of prismatic rods in restricted volumes are considered, and added masses are evaluated as well as added inertia momenta and corresponding damping coefficients. Estimates of added masses and damping are presented for a cylindrical shell which oscillates in a restricted liquid volume. Even at a maximum possible oscillation amplitude nonlinearity of hydrodynamic time lag is shown to be sufficiently small and may be not taken into account while calculating natural oscillation frequencies of round rods. (Atomindex citation 11:549234)

GEAP-25163-3 PC **A06**/MF **A01**
Commonwealth Research Corp., Chicago, IL.
Demonstration of Fuel Resistant to Pellet-Cladding Interaction: Phase 2. Third Semiannual Report, January-June 1980.
H. S. Rosenbaum. Sep 80, 116p
Contract AC02-77ET34001

Two fuel concepts are being developed for possible demonstration within this program: (a) Cu-barrier fuel and (b) Zr-liner fuel. These advanced fuels (known collectively as barrier fuels) have special fuel cladding designed to avoid the harmful effects of localized stress and reactive fission products during reactor service. Within the work scope of this program one of these concepts is to be selected for demonstration in a commercial power reactor. It was decided to demonstrate Zr-liner in 132 bundles which have liners of either crystal-bar zirconium or of low-oxygen sponge zirconium in the reload for Quad Cities Unit 2, Cycle 6. Irradiation testing or barrier fuel was continued, and the superior PCI resistance of Zr-liner fuel was further substantiated in the current report period. Furthermore, an irradiation experiment in which Zr-liner fuel, having a deliberately fabricated cladding perforation, was operated at a linear heat generation rate of 35 kW/m to a burnup of approx. 3 MWd/kg U showed no unusual signs of degradation compared with a similarly defected reference fuel rod. Four lead test assemblies of barrier fuel (two of Zr-liner and two of Cu-barrier), presently under irradiation in Quad Cities Unit 1, have achieved a burnup of 11 MWd/kg U. (ERA citation 06:006046)

HEDL-SA-2084-FP PC **A02**/MF **A01**
Nuclear Packaging, Inc., Tacoma, WA.
T-3, a Packaging and Transportation System for Irradiated US Breeder Reactor Experiments.
L. J. Hansen, J. D. Berg, J. D. Berger, E. T. Weber, and J. J. Krupar. 1980, 9p CONF-801115-37
Contract AC14-76FF02170
International symposium on packaging and transporting radioactive material, Berlin, F.R. Germany, 10 Nov 1980.

Irradiation testing of fast reactor fuels and materials in EBR-II, TREAT, and other US facilities required a packaging and transportation system that would ensure that changes in the specimens were irradiation induced and not the result of transport. The T-2 cask and the development of the T-3 cask are discussed. (ERA citation 06:005807)

HEDL-SA-2190-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Performance of Commercially Produced Mixed-Oxide Fuels in EBR-II.
J. W. Hales, and L. A. Lawrence. Nov 80, 21p CONF-801107-50
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

Commercially produced fuels for the Fast Flux Test Facility (FFTF) were irradiated in EBR-II under conditions of high cladding temperature (approx. 700 exp 0 C) and low power (approx. 200 W/cm) to verify that manufacturing processes did not introduce variables which significantly affect general fuel performance. Four interim examinations and a terminal examination were completed to a peak burnup of 5.2 at. % to provide irradiation data pertaining to fuel restructuring and dimensional stability at low fuel temperature, fuel-cladding reactions at high cladding temperature and general fuel behavior. The examinations indicate completely satisfactory irradiation performance for low heat rates and high cladding temperatures to 5.2 at. % burnup. (ERA citation 06:006054)

HEDL-SA-2206-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Fuel-Cladding Chemical Interaction in Mixed-Oxide Fuel at High Burnup.
L. A. Lawrence, and J. W. Jost. Oct 80, 22p
CONF-801107-49
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

The HEDL FCCI correlation has been expanded to peak burnups up to 14.5 at. %. Increases in depth of interaction were found to be linear with burnup to approximately twice the FFTF goal burnup. Examinations of the peak burnup pin P-23A-18 indicates that it was very close to a true end-of-life breach, demonstrating a substantial burnup capability for FFTF reference design mixed-oxide fuel operating at high cladding temperatures. (ERA citation 06:006055)

HEDL-SA-2209-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Effects of Variations in Fuel Pellet Composition and Size on Mixed-Oxide Fuel Pin Performance.
B. J. Makenas, B. W. Jensen, and R. B. Baker. Oct 80, 19p CONF-801107-53
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

Experiments have been conducted which assess the effects on fuel pin performance of specific minor variations from nominal in both fuel pellet size and pellet composition. Such pellets are generally referred to in the literature as rogue pellets. The effect of these rogue pellets on fuel pin and reactor performance is shown to be minimal. (ERA citation 06:007740)

HEDL-SA-2210-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Breached Pin Performance in Reference Design Fuel Pins.
B. J. Makenas, and J. W. Weber. Oct 80, 23p
CONF-801107-52
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

All of the 19 HEDL mixed oxide (75% UO sub 2 , 25% PuO sub 2) FFTF reference design experiments in EBR-II have now been completed. Many of the experiments were deliberately irradiated to high burnup in order to determine failure mechanisms, and cladding breaches occurred in 20 of the 1156 stainless steel clad pins irradiated in these subassemblies. Results from the examinations of 12 of these pins were reported previously. The examinations of the four most recent breached pins (P-14-29, 23B-31B, 23C-12A, and 23C-7A) are the subject of this paper. (ERA citation 06:006056)

HEDL-6890 PC **A04**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Thermal Analysis of the IDENT 1578 Fuel Pin Shipping Container.
J. G. Ingham. Jan 80, 63p
Contract AC14-76FF02170

The IDENT 1578 container, which is a 110-in. long 5.5-in. OD tube, is designed for shipping FFTF fuel elements in T-3 casks between HEDL, HFEF, and other laboratories. The thermal analysis was conducted to evaluate whether or not the container satisfies its thermal design criteria (handle a decay heat load of 600 watts, max fuel pin cladding temperature not exceeding 800 exp 0 F). (ERA citation 06:005806)

IAE-2946 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Application of gamma Scanning and Neutron Radiography Methods to Control Fuel Element State as Tested in MR Reactor Loop Channels.
A. V. Borodin, V. I. Vikhrov, and V. T. Korneev. 1979, 12p
In Russian.
U.S. Sales Only.

The gamma-scanning and neutron radiography methods are described used for non-destructive control of fuel elements after their test in the loop channels of MR reactor, and also the equipment utilized. The techniques and the results obtained while studying fuel elements using the above mentioned methods are provided. It is established that gamma-scanning method can only indicate the presence of defect in the continuity of the fuel element core without identifying its type whereas the advantage of neutron radiography method is in obtaining visual results. At the same time gamma-scanning method makes it possible to determine energy release on the length of fuel elements, to find the burn up fraction, to study the phenomenon of fusion products migration which is difficult or impossible with neutron radiography method. A conclusion is drawn that gamma-scanning and neutron radiography methods successfully supplement each other and make it possible to obtain important information on fuel state in the irradiated fuel elements. (Atomindex citation 11:531736)

IAEA-R-1893-F PC **A02**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
Determination of Contaminants in Nuclear Materials by Measuring the Capture gamma Rays of Thermal Neutrons in a Reactor Internal Geometry. Final Report for the Period 1 November 1976-30 June 1979.
A. A. Suarez. Jan 80, 10p
U.S. Sales Only.

A new method for analysis of impurities in nuclear fuel material was developed. Prompt gamma rays following thermal neutron capture, from a sample placed inside the research reactor were analyzed with a solid state high resolution detector. A number of improvements were introduced to improve the background-to-signal ratio, and the sensitivity of the method: use of collimeters for gamma rays and exp 6 Li sub 2 CO sub 3 filters to eliminate thermal neutrons from the beam were supplemented with the application of a pair spectrometer. Using a 42.5 cm exp 3 true coaxial Ge(Li) detector, and two optically separated NaI (Tl) scintillation detector, the sensitivity of the method for quantitative determination of impurities reached 30 p.p.m. The reproducibility of the results was better than 2%. (Atomindex citation 11:531939)

IEA-DT-079 PC **A04**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Testing of Reactor Fuel Materials Using Nuclear Techniques.
M. T. F. C. Khouri. Sep 78, 71p
In Portuguese.Thesis.
U.S. Sales Only.

The tests presented here apply to: the quantitative determination of uranium in the core of fuel element plates by the detection of the number of neutrons produced in photo induced reactions in uranium; the determination of exp 235 U proportion in uranium dioxide samples, in the form of uranyl nitrate, by the technique of the detection of tracks produced by fission fragments and in pellet samples by passive gamma spectrometry and the checking of uranium homogenization distribution in fuel plates and uranium dioxide pellets. (Atomindex citation 11:552810)

INFCE/DEP/WG-1/6 PC **A08**/MF **A01**
INFCE Working Group 1. Secretariat.
Calculation of Demands for Nuclear Fuels and Fuel Cycle Services. Description of Computer Model and Strategies Developed by Working Group 1.
161p
U.S. Sales Only.

Working Group 1 examined a range of reactor deployment strategies and fuel cycle options, in oder to estimate the range of nuclear fuel requirements and fuel cycle service needs which would result. The computer model, its verification in comparison with other models, the strategies to be examined through use of the model, and the range of results obtained are described. (Atomindex citation 11:532308)

Juel-1639 PC **A05**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorwerkstoffe und Heisse Zellen.
Mechanisms of Surface Scale Formation in HTR Helium.
D. F. Lupton. Jan 80, 92p
U.S. Sales Only.

Most high temperature alloys are carburised by exposure in simulated HTR helium environments, particularly at temperatures over 800 exp 0 C. The rate of carburisation can, however, be reduced by surface oxide scales which form during exposure. This export reviews the current status of knowledge concerning: the formation of surface oxide scales in purely oxidising environments, the complex local thermodynamics of the surface scale in HTR helium, experimental observations of surface scales formed in a variety of different simulated HTR environments. It is shown that oxidation in 'dry' atmospheres, particularly in the early stages of exposure, is dominated by CO which can oxidise Al, Si and Ti at all temperatures of interest. Cr can also react strongly with CO, but apparently largely by means of a complex reaction which results in the simultaneous formation of Cr sub 2 O sub 3 and carbide. The resulting Cr sub 2 O sub 3 /carbide scales are porous and appear to offer little protection against carburisation. (Atomindex citation 11:546498)

JAERI-M-8311 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Heating Apparatus for Single-Fuel-Rod Experiments.
Y. Kaneko, M. Takeuchi, and T. Masuyama. Jul 79, 58p
In Japanese.
U.S. Sales Only.

A single-fuel-rod heating apparatus was constructed for installation to Semi-Homogeneous Experimental Assembly (SHE) which is used to measure the reactivity temperature coefficient of a single fuel rod in verification of the precision of nuclear design of the VHTR (very high temperature reactor). The apparatus raises the temperature of a single fuel rod up to 700 exp 0 C. A fuel rod is enclosed in a silica tube coiled with nichrome heater. The silica tube is confined in a zircalloy tube of which outer surfaces are cooled with air to remove the radiation heat. The zircalloy tube is then confined in a double-walled evacuated aluminum tube to prevent heat transfer to SHE core. The heating apparatus consists of evacuation, cooling, instrumentation, control and safety system, beside the heating tube. The heating tube is inserted in a space made by withdrawing a graphite matrix tube along the central axis of SHE core. The base of the heating tube is connected to an evacuation system, which is set on the table of the movable half of SHE. Performance of the heating apparatus shown by test operation with a single graphite rod are: 1. Single fuel rod: 24 mm in diameter, 2400 mm long. 2. Heating ability: The heating up of a single fuel rod to 700 exp 0 C in 40 min with electric power 3 kW. 3. Cooling capacity: Blower in flow 1.4 m exp 3 /min at pressure 0.4 kg/cm exp 2 . 4. Heat leakage: lower than 20 W. (Atomindex citation 11:525911)

JAERI-M-8399 PC **A12**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Design Studies for the Mark-III Core of Experimental Multi-Purpose VHTR.
T. Yasuno, Y. Miyamoto, S. Mitake, R. Shindo, and T. Arai. Aug 79, 253p

In Japanese.
U.S. Sales Only.

The Mark-III core in the first conceptual design made in 1975 is a fundamental core for VHTR. Subsequently, further design studies were made fuel loading scheme and control rod withdrawal sequence for the core to increase its safety margin (shutdown margin, etc.) and operational margin (minimum Reynolds number, maximum fuel temperature, etc.). It was shown that the Mark-III should exhibit the performance expected of VHTR, unless changes are made in the preconditions for its nuclear, thermal-hydraulic design. Also, the needs as below were indicated: (1) reasonable core design criteria and guidelines, (2) fuel-loading-scheme requirements in fuel management, fuel misloading and reactor operation, (3) confirmation on precision of the core design method and its further refinement. (Atomindex citation 11:525918)

JAERI-M-8400 PC **A10**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Design Studies on Irradiation-Bed Core of the Experimental Multi-Purpose VHTR.
T. Yasuno, Y. Miyamoto, S. Mitake, R. Shindo, and T. Arai. Sep 79, 222p
In Japanese.
U.S. Sales Only.

For the experimental multi-purpose Very High Temperature Gas Cooled Reactor used as an irradiation bed, core composition, core performance and the requirements of reactor structure and plant operation were studied. The core used for irradiation consists of the test region with seven fuel columns in the core and a driver region surrounding it. Test fuel elements placed in the test region are to be irradiated under conditions similar to those of large VHTR. Burn-up of the test fuel reaches 80 GWd/t of large VHTR at about 1200 days but its power density is about half the target value, when the core is used jointly with demonstration test of nuclear process heat applications. It was shown that the core performance could be improved by plant operations with lower coolant temperature at the reactor outlet than normal or with semi-pin fuel elements used in the driver region and the core could be used sufficiently for irradiation purposes. (Atomindex citation 11:525917)

JAERI-M-8457 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Calibration of Energy Deposition in the NSRR Test Fuel Rod by Calorimetric Measurement.
S. Yanagihara, T. Hoshi, and S. Shiozawa. Oct 79, 36p
In Japanese.
U.S. Sales Only.

In the NSRR experiments, fuel behavior such as oxidation and fuel failure is correlated with the energy deposition(cal/g.UO sub 2) in a test fuel rod. The energy deposition in the fuel rod is usually calculated from the integrated reactor power (Mw-sec) since the energy deposition is proportional to the integrated reactor power in pulse operation. The correlation factor between the energy deposition in the fuel rod and the integrated reactor power is determined by quantitative analysis of fission products in the fuel rod by gamma -ray spectrometry. Then, the correlation factor determined by gamma -ray spectrometry is about 25% higher than that by physics calculation. Therefore, calorimetric calibration was made to confirm the value. The value calibrated by calorimetry is 4.52 cal/g.UO sub 2 /Mw-sec. It agrees with the value of 4.36 cal/g.UO sub 2 /Mw-sec determined by gamma -ray spectrometry. (Atomindex citation 11:525946)

K/OA-4783(Rev.1) PC **A03**/MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
Description of the Portsmouth Gas Centrifuge Enrichment Plant.
W. B. Arthur. 16 Dec 80, 26p
Contract W-7405-ENG-26

The Portsmouth Gas Centrifuge Enrichment Plant (GCEP) will be located at the site of the Portsmouth Gaseous Diffusion Plant in Piketon, Ohio. The purpose of the facility is to provide enriching services for the production of low assay enriched uranium for civilian nuclear power reactors. The construction and operation of the GCEP is administered by the US Department of Energy. The facility will be operated under contract from the US Government. Control of the GCEP rests solely with the US Government, which holds and controls access to the technology. Construction of GCEP is expected to be completed in the mid-1990's. Many facility design and operating procedures are subject to change. Nonetheless, the design described in this report does reflect current thinking. Descriptions of the general facility and major buildings such as the process buildings, feed and withdrawal building, cylinder storage and transfer, recycle/assembly building, and a summary of the centrifuge uranium enriching process are provided in this report. (ERA citation 06:006994)

KAERI-208/RR-77/79 PC **A02**/MF **A01**
Korea Atomic Energy Research Inst., Seoul.
Radiography on Fuels for TRIGA Mark-III Reactor.
Y. P. Lee, K. J. Kwak, H. S. Ahn, and K. G. You. 1979, 23p
In Korean.
U.S. Sales Only.

About 100 fuel rods for TRIGA Mark III reactor to be loaded are tested by radiographic technique in KAERI with 170 KV and 2 MeV X-ray. Manufacturing conditions of the fuel pellets have been found to be irregular. Many of the pellets of fuel rods are cracked. Many spots are found on radiographic film, which are sure to be voids. (Atomindex citation 11:549221)

KFK-2938 PC **A02**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Entwicklungsgruppe Kernmaterialsicherung.
Report on R + D Activities 1979 of the Department for the Management of Nuclear Materials (EKS).
Feb 80, 7p
In German.
U.S. Sales Only.

The Entwicklungsabteilung Kernmaterialsicherung (EKS) carries out R + D work on the protection of nuclear materials and nuclear facilities and work on the analysis, development and testing of concepts and measures for the international safeguarding of nuclear materials. The latter department is fully integrated in the nuclear safeguards project. The nuclear safeguards project and the protection of nuclear materials and facilities have been combined under the heading of materials management. (Atomindex citation 11:553195)

KFK-2947 PC **A06**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung.
Design, Irradiation and Post-Irradiation Examination of the (U,Pu) C Fuel Pins of the Test Group FR 2-6D.
F. Bauer, W. Ernst, and P. Weimar. May 80, 101p
In German.
U.S. Sales Only.

In the frame of the capsule group 6d three mixed carbide pins (pellet-density 92% T.D.) with a big radial gap (250 mu m) were irradiated in the thermal neutron flux of FR 2. The cladding material consisted of the austenitic steel No. 1.4988. The exposure time in the reactor was up to 680 days, the burnup was 7.4 at %. The pins were instrumented on their surface with 6 thermocouples each. During irradiation in the NaK capsule no bigger irregularities in temperature readings were found. During dismantling in Karlsruhe Hot Cells the capsules it was found that all 3 pins showed cracks on their clads. The profilometry of the pins showed diameter increases from 4.5 to 6.0%. The carburization of the cladding proved the same tolerable magnitude as found for pins irradiated with moderate rod powers (Tsub(clad) <= 600 exp 0 C). Comparing ceramography with that of other pins of the same capsule group (KfK 2577) no bigger differences in structure were found. (Atomindex citation 11:552880)

KFK-2971 PC **A05**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Spaltstoffflusskontrolle.
Annual Report of the Nuclear Safeguards Project 1978.
H. R. Mache. May 80, 76p
In German.
U.S. Sales Only.

The present report describes the major activities carried out in 1978 in the framework of the Nuclear Safeguards Project by the institutes of the Kernforschungszentrum Karlsruhe, Kernforschungsanlage Juelich, the European Institute of Transuranium Elements and some industrial firms. (Atomindex citation 11:549657)

LA-tr-80-32 PC **A03**/MF **A01**
Los Alamos National Lab., NM.
Schematic Flowsheet Comparison of Reprocessing Plants.
F. Baumgaertner. 1980, 30p
Contract W-7405-ENG-36
RA, Atomkernenerg./Kerntech. 35 n2 P81-94 1980.

Schematic flowsheets of representative Purex-type reprocessing plants namely Purexplant Hanford, Magnoxplant Windscale, NFS, Tokai Mura, Eurochemic, WAK, BNFP and NFRRC are presented. The process schemes allow direct comparison of different plants by superposition. The following characteristics of the plants are compared: the arrangement of extraction cycles with position of extractors; the combination of solvent washing cycles as sources of the alkaline medium active waste; and the raffinate- and condensate-streams as well as the product purification in front of evaporators as the sources of acid and organic medium active waste. (ERA citation 06:006998)

LA-tr-80-33 PC **A02**/MF **A01**
Los Alamos National Lab., NM.
Design Data of Selected Reprocessing Plants.
H. Goldacker, and H. Schmeider. 1980, 16p
Contract W-7405-ENG-36
A, Atomkernenerg./Kerntech. 35 n2 P100-104 1980.

Extractor design data of selected reprocessing plants are compared, the flowsheets and choice of extractor types of which are relevant for the planning of a German reprocessing plant today. The basis for the comparison are the published reports. (ERA citation 06:006995)

LA-tr-80-39 PC **A02**/MF **A01**
Los Alamos National Lab., NM.
Unloading and Transfer Techniques of Spent Fuel.
P. Kunze. 1980, 23p
Contract W-7405-ENG-26
A, Atomkernenerg./Kerntech. 35 n2 P105-110 1980.

This paper shows the handling of spent LWR-fuel in the head-end part of the fuel reprocessing facility. Installations, handling, and transfer techniques are described in the cask unloading area, as well as in the storage pond, in the mechanical cell and also in the dissolver. Furthermore the different technical installations in the most important plants in Europe, USA and Japan are described, together with the concept of the future plants of USA and Great Britain. (ERA citation 06:006997)

ORNL/TM-7432 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Preliminary Evaluation of Alternate-Fueled Gas Cooled Fast Reactors.
J. R. White, and T. J. Burns. Dec 80, 57p
Contract W-7405-ENG-26

A preliminary evaluation of various alternative fuel cycles for the Gas-Cooled Fast Reactor (GCFR) is presented. Both homogeneous and heterogeneous oxide-fueled GCFRs are considered. The scenario considered is the energy center/dispersed reactor concept in which proliferation-resistant denatured reactors are coupled to exp 233 U production reactors operating in secure energy centers. Individual reactor performance characteristics and symbiotic system parameters are summarized for several possible alternative fuel concepts. Comparisons are made between the classical homogeneous GCFR and the advanced heterogeneous concept on the basis of breeding ratio, doubling time, and net fissile gain. In addition, com-

parisons are made between a three-dimensional reactor model and the R-Z heterogeneous configuration utilized for the depletion and fuel management calculations. Lastly, thirty-year mass balance data are given for the various GCFR fuel cycles studied. (ERA citation 06:006059)

ORNL/TM-7480 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Characterization of Four Prestressed Concrete Reactor Vessel Liner Steels.
R. K. Nanstad. Dec 80, 83p
Contract W-7405-ENG-26

A program of fracture toughness testing and analysis is being performed with PCRV steels for HTGRs. This report focuses on background information for the base materials and results of characterization testing, such as tensile and impact properties, chemical composition, and microstructural examination. The steels tested were an SA-508 class 1 forging, two plates of SA-537 class 1, and one plate of SA-537 class 2. Tensile requirements in effect at the time of procurement are met by all four steels. However, the SA-537 class 2 plate would not meet the minimum requirement for yield strength. Drop-weight and Charpy impact tests verified that the RT/sub NDT/ is equal to the NDT for each steel. Charpy impact energies at the NDT range from 40 J (30 ft-lb) for one heat of SA-537 class 1 to 100 J (74 ft-lb) for the SA-537 class 2 plate; upper-shelf energies range from 170 to 310 J (125 to 228 ft-lb) for the same two steels, respectively. The onset of upper-shelf energy occurred at temperatures ranging from 0 to 50 exp 0 C. (ERA citation 06:007737)

ORNL/TM-7607 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Fabrication of High-Uranium-Loaded U sub 3 O sub 8 -Al Developmental Fuel Plates.
G. L. Copeland, and M. M. Martin. Dec 80, 19p
Contract W-7405-ENG-26

A common plate-type fuel for research and test reactors is U sub 3 O sub 8 dispersed in aluminum and clad with an aluminum alloy. There is an impetus to reduce the exp 235 U enrichment from above 90% to below 20% for these fuels to lessen the risk of diversion of the uranium for nonpeaceful uses. Thus, the uranium content of the fuel plates has to be increased to maintain the performance of the reactors. This paper describes work at ORNL to determine the maximal uranium loading for these fuels that can be fabricated with commercially proven materials and techniques and that can be expected to perform satisfactorily in service. (ERA citation 06:006081)

PAT-APPL-6-119 740 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Hydrogen Permeation Resistant Barrier.
Patent Application,
J. C. McGuire, and W. F. Brehm. Filed 8 Feb 80, 8p
Contract EY-76-C-14-2170
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A hydrogen permeation resistant barrier is formed by diffusing aluminum into an iron or nickel alloy and forming an intermetallic aluminide layer. (ERA citation 06:004853)

RISO-M-2185 PC **A03**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
Calculation of Heat Rating and Burn-Up for Test Fuel Pins Irradiated in DR 3.
C. Bagger, H. Carlsen, and K. Hansen. Jan 80, 50p
U.S. Sales Only.

A summary of the DR 3 reactor and HP1 rig design is given followed by a detailed description of the calculation procedure for obtaining linear heat rating and burn-up values of fuel pins irradiated in HP1 rigs. The calculations are carried out rather detailed, especially regarding features like end pellet contribution to power as a function of burn-up, gamma heat contributions, and evaluation of local values of heat rating and burn-up. Included in the report is also a description of the fast flux- and cladding temperature calculation techniques currently used. A good agreement between measured and calculated local burn-up values is found. This gives confidence to the detailed treatment of the data. (Atomindex citation 11:532103)

RTS-11721 PC **A02**/MF **A01**
British Library Lending Div., Boston Spa (England).
Uranium Production from Phosphates.
Z. Ketzinel, and Y. Folkman. May 79, 6p INIS-mf-1966-2
U.S. Sales Only.

According to estimates of the world's uranium consumption, exploitation of most rich sources is expected by the 1980's. Forecasts show that the rate of uranium consumption will increase towards the end of the century. It is therefore desirable to exploit poor sources not yet in use. In the near future, the most reasonable source for developing uranium is phosphate rock. Uranium reserves in phosphates are estimated at a few million tons. Production of uranium from phosphates is as a by-product of phosphate rock processing and phosphoric acid production; it will then be possible to save the costs incurred in crushing and dissolving the rock when calculating uranium production costs. Estimates show that the U.S. wastes about 3,000 tons of uranium per annum in phosphoric acid based fertilisers. Studies have also been carried out in France, Yugoslavia and India. In Israel, during the 1950's, a small plant was operated in Haifa by 'Chemical and Phosphates'. Uranium processes have also been developed by linking with the extraction processes at Arad. Currently there is almost no activity on this subject because there are no large phosphoric acid plants which would enable production to take place on a reasonable scale. Discussions are taking place about the installation of a plant for phosphoric acid production utilising the 'wet process', producing 200 to 250,000 tons P sub 2 O sub 5 per annum. It is necessary to combine these facilities with uranium production plant. (Atomindex citation 11:546580)

TRITA-KKE-8001 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Kaernkemi.
Uranium from Sea Water.
T. Westermark, and S. Forsberg. Jan 80, 46p
In Swedish.
U.S. Sales Only.

The prevalent situation in the field of uranium extraction from the oceans was reviewed from a scientific and technological standpoint and as to legality too. No international convention seems to limit the access to dissolved or suspended matter in free area of the oceans. All publications received through 1979 point to adsorption as the method of choice, at some form of hydrated titanium "oxide" as the most promising sorbent, and, generally spoken, at the cost of pumping water through the contacting system as a huge economical problem. A recent Swedish invention may circumvent the pumping problem by making available, in a previously unknown manner, some kind of self-renewing energy from the oceans. A simple economic calculus has resulted in costs from two to six times the present world market price of crude uranium oxide (which is assumed to be US dollar 43.-/1b), with a possibility to compete really after some technical and systematic developments. Results from a small-scale adsorption experiment in genuine sea water are presented: During a few weeks sea water was pumped through tiny, 10 cm high beds of sodium titanate ion exchangers, partly in the hydrogen form. The grain size was 250-500 mu m, the flow rate 0.15-0.61 m/min. About 5% of the total amount of uranium passing the columns was retained, resulting in 8-11 mu g/Ug. Also, large amounts of manganese, strontium, vanadium and zink were retained. Some of these elements and plankton as well may perhaps be recovered with an economic gain. (Atomindex citation 11:549614)

18K. Reactor Physics

ANL-80-78 PC **A13**/MF **A01**
Argonne National Lab., IL.
Proceedings of the NEACRP/IAEA Specialists Meeting on the International Comparison Calculation of a Large Sodium-Cooled Fast Breeder Reactor at Argonne National Laboratory on February 7-9, 1978.
L. G. LeSage, R. D. McKnight, D. C. Wade, K. E. Freese, and P. J. Collins. Aug 80, 290p NEA-CRP-L-243
Contract W-31-109-ENG-38

The results of an international comparison calculation of a large (1250 MWe) LMFBR benchmark model are presented and discussed. Eight reactor configurations were calculated. Parameters included with the comparison were: eigenvalue, k/sub infinity/, neutron balance data, breeding reaction rate ratios, reactivity worths, central control rod worth, regional sodium void reactivity, core Doppler and effective delayed neutron fraction. Ten countries participated in the comparison, and sixteen solutions were contributed. The discussion focuses on the variation in parameter values, the degree of consistency among the various parameters and solutions, and the identification of unexpected results. The results are displayed and discussed both by individual participants and by groupings of participants (e.g., results from adjusted data sets versus non-adjusted data sets). (ERA citation 06:007738)

BARC-1049 PC **A02**/MF **A01**
Bhabha Atomic Research Centre, Bombay (India).
Two-Dimensional Space-Time Kinetics Model Using the Adiabatic Approach.
H. P. Gupta, V. K. Jain, and M. S. Trasi. 1980, 17p
U.S. Sales Only.

A two-dimensional space-time kinetics code, based on the adiabatic method is described. In this approach, the space, energy and time dependent flux is factorized into an amplitude factor and a shape function, the latter being assumed to be slowly varying in time as compared to the former. Further, one does not distinguish between the shapes of delayed and prompt neutron sources. The shape function is calculated at selected times by solving numerically a multigroup static eigenvalue diffusion equation by the finite difference method. Between two consecutive time-steps, the point kinetics equations are solved by Cohen's method. Feedback is introduced through changes in cross-sections. With the changed cross-sections, the static calculation is repeated. The cycle is repeated till convergence is achieved in reactivity and temperatures. The code was tested against a typical fast reactor benchmark. The results agree well with those obtained elsewhere. (Atomindex citation 11:552772)

CEGB-RD/B/N-4630 PC **A02**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
Comparison of Different Methods of Measuring Reactivity Including an Improved Technique - Super Source Jerk.
T. A. Lewis. Aug 79, 17p
U.S. Sales Only.

Throughout the HITREX series of reactors considerable difficulty has been encountered in the theoretical description of the worth of control rods. Much effort has been put into checking the calculational methods and this note describes the complementary exercise of checking the measurement techniques. To achieve a realistic check an improved technique for the measurement of subcritical reactivity was developed. This development is described. (Atomindex citation 11:525943)

CTA-EAV-006/79 PC **A04**/MF **A01**
Centro Tecnico Aeroespacial, Sao Jose dos Campos (Brazil). Inst. de Atividades Espaciais.
Analysis of Fast Neutrons Elastic Moderator Through Exact Solutions Involving Synthetic-Kernels.
C. Moura Neto, F. L. Chung, and E. S. Amorim. Jul 79, 54p
In Portuguese.
U.S. Sales Only.

The computation difficulties in the transport equation solution applied to fast reactors can be reduced by the development of approximate models, assuming that the continuous moderation holds.

Two approximations were studied. The first one was based on an expansion in Taylor's series (Fermi, Wigner, Greuling and Goertzel models), and the second involving the utilization of synthetic Kernels (Walti, Turinsky, Becker and Malaviya models). The flux obtained by the exact method is compared with the fluxes from the different models based on synthetic Kernels. It can be verified that the present study is realistic for energies smaller than the threshold for inelastic scattering, as well as in the resonance region. (Atomindex citation 11:552777)

HEDL-SA-2178-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Evaluation of MSM for Assessing Subcritical Reactivities in FFTF.
P. A. Ombrellaro, R. A. Harris, J. W. Daughtry, and R. A. Bennett. 1980, 17p CONF-801107-56
Contract AC14-76FF02170
ANS international conference, Washington, DC, USA, 17 Nov 1980.

Modified Source Multiplication (MSM) is the method that will be used to monitor the subcritical reactivity of the Fast Flux Test Facility (FFTF) reactor during startup, acceptance testing, shutdown and refueling operations. Evaluation of the method as a subcritical reactivity monitoring system in FFTF was provided by the following types of measurements: (a) a calibration of MSM with an Inverse Kinetics Rod Drop (IKRD) method; (b) measurement of the reactivity of a variety of subcritical states by both the MSM and IKRD method; and (c) measurement of subcritical reactivities by MSM and comparison of results with calculated reactivities for subcritical states where inverse kinetics can no longer be used. (ERA citation 06:007739)

IEA-DT-132 PC **A05**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Spatial Distribution of the Neutron Flux in the IEA-R1 Reactor Core Obtained by Means of Foil Activation.
J. Mestnik Filho. Jun 79, 78p
In Portuguese.Thesis.
U.S. Sales Only.

A three-dimensional distribution of the neutron flux in IEA-R1 reactor, obtained by activating gold foils, is presented. The foils of diameter 8mm and thickness 0,013mm were mounted on lucite plates and located between the fuel element plates. Foil activities were measured using a 3x3 inches NaI(Tl) scintilation detector calibrated against a 4 pi beta gamma coincidence detector. Foil positions were chosen to minimize the errors of measurement; the overall estimated error on the measured flux is 5%. (Atomindex citation 11:552776)

IKE-6-129 PC **A06**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme.
Applying the Response Matrix Method for Solving Coupled Neutron Diffusion and Transport Problems.
G. S. Sibiya. 11 Apr 80, 117p
In German.Thesis.
U.S. Sales Only.

The numerical determination of the flux and power distribution in the design of large power reactors is quite a time-consuming procedure if the space under consideration is to be subdivided into very fine weshes. Many computing methods applied in reactor physics (such as the finite-difference method) require considerable computing time. In this thesis it is shown that the response matrix method can be successfully used as an alternative approach to solving the two-dimension diffusion equation. Furthermore it is shown that sufficient accuracy of the method is achieved by assuming a linear space dependence of the neutron currents on the boundaries of the geometries defined for the given space. (Atomindex citation 11:552780)

INIS-mf-5072 PC **A02**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung.
Critical HTR-Test Facility Kahter. A Program for Verification of Theoretical Models and Minimization of Layout and Safety Margins.
V. Drueke, D. Filges, H. Gerwin, R. Hecker, and R. D. Neef. 1978, 11p CONF-781022-140
Meeting on nuclear power reactor safety, Brussels, Belgium, 16 Oct 1978.
U.S. Sales Only.

The critical facility KAHTER has been used to verify and to adjust theoretical models describing the nuclear behaviour of HTR pebble bed reactors. Methods such as evaluating critical masses, flux mappings and reaction rate measurements, more sophisticated experimental and theoretical methods have been developed to get exact information and interpretation of control rod efficiency, power determination and fast neutron damage. (Atomindex citation 11:531364)

18M. Reactors (Non-Power)

IAEA-mf-1 PC **A17**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
Research Reactors in Member States. 1980 Edition.
1980, 376p
U.S. Sales Only.

Data on operational, under construction, shutdown and planned research reactors are presented. (Atomindex citation 11:532106)

19.
ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

AD-A094 741/6 PC **A14**/MF **A01**
IIT Research Inst., Chicago, IL.
Development of a Hazard Classification Procedure for Inprocess Propellant and Explosive Materials.
Final rept.,
Hyla S. Napadensky, Ronald Pape, Richard Rindner, and Daniel Satriana. Nov 80, 311p
IITRI-J6432, ARLCD-SP-80004, AD-E400 513
Contract DAAK10-78-C-0029

A hazards classification procedure has been developed for inprocess propellant and explosive materials. In developing the procedure, accident reports in the DOD Explosives Safety Board files, hazards analyses, and existing test methods were reviewed. These were used as the basis for developing a preliminary structure for the hazards classification procedure. The most promising test for incorporation into the procedure was experimental evaluations. Evaluations were completed for local impact, rubbing friction, local thermal, regional thermal, electrostatic discharge, critical diameter, critical layer thickness, tube transition, layer transition, mass explosion, mass fire and firespread tests. The results of these tests served as the basis of the final hazards classification procedure.

AD-A094 754/9 PC **A03**/MF **A01**
Army Armament Research and Development Command, Dover, NJ. Large Caliber Weapon Systems Lab.
Photoflash Compositions Desensitized by Coatants.
Technical rept.,
S. Dallman, B. Werbel, and F. R. Taylor. Dec 80, 30p ARLCD-TR-80043, AD-E400 522

A process for blending photoflash powder was investigated in which the powder was coated with material for the purpose of decreasing the hazard. Various coatant candidates were applied by both coacervation and contact methods, and the resulting formulations characterized with respect to physico-chemical, sensitivity, stability, and performance properties. The method finally selected was contact coating from a wet medium employing an electrically conducting carbon black as coatant. During the program there was a scale-up from laboratory bench quantities to a 5 kg batch. For the larger batches a counter current mix muller was employed. The method is safer than the non-proprietary standard methods previously used, since the material is wet or damp throughout the blending process. Furthermore, the coating, by its ability to leak off voltage, reduces the electrostatic hazards during the blending and further processing of the powder. The product obtained is stable and equals the performance of the uncoated formulations.

AD-A094 843/0 PC **A05**/MF **A01**
Harry Diamond Labs., Adelphi, MD.
Aerosol Discrimination by Electronic High- and Low-Pass Filtering.
Technical rept.,
Dennis W. McGuire, Michael Conner, and Theodore H. Hopp. Dec 80, 76p Rept no. HDL-TR-1939

Two electronic techniques are investigated for discriminating between aerosol and rigid-target (such as aircraft and terrain) return signals in pulsed active optical sensors (proximity fuzes). Short transmitter pulses approximately 5 to 10 ns full width at half maximum are considered in systems with pencil-beam influence patterns. Relative pulse stretching of aerosol returns is exploited for discrimination by using either a differentiating circuit or a low-pass filter to bring out pulse-speed or pulse-width differences. The investigations involve modeling and analysis, as well as testing the discrimination schemes with measured aerosol-return signals from cumulus clouds. Both techniques are found to be potentially effective for designing proximity fuzes that reject aerosol signals. (Author)

AD-A095 028/7 PC **A03**/MF **A01**
Harry Diamond Labs., Adelphi, MD.
A Review of Models of the Fluidic Generator.
Progress rept. Sep 78-Sep 79,
Richard Deadwyler. Nov 80, 43p Rept no. HDL-PR-80-4

The fluidic generator is a pneumatic-to-electrical transducer that provides electrical power for the fuze circuits in missiles and rockets. It consists of four subsystems: (1) the jet-forcing mechanism (the annular nozzle and the knife edge of the resonator), (2) the resonant cavity, (3) the mechanical diaphragm assembly (the diaphragm, connecting rod, and reed), and (4) the electrical circuit. The first three subsystems constitute a feedback control system, in which ram-air input to the generator is brought into oscillation with a resonant or reflecting structure controlling the feedback. Pressure feedback signals are generated by sonic reflections from (1) the knife edge, (2) the cavity (assuming that the diaphragm is not moving), and (3) the moving diaphragm. The feedback signals are summed or coupled at the nozzle exit region of the jet. This physical model shows that the generator can be forced to jump to nondesign frequencies of oscillation because any change in the potential of the input jet will change the signal propagation or convection speed in the forward path and the acoustic speed in the feedback path. Thus, the physical model provides a qualitative answer to the question of jumps in the generator operating frequency.

LA-8591-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Investigating Explosive and Material Properties by Use of the Plate Dent Test.
G. H. Pimbley, A. L. Bowman, W. P. Fox, J. D. Kershner, and C. L. Mader. Nov 80, 23p
Contract W-7405-ENG-36

The plate dent test is a fast, reliable, and inexpensive way to estimate the relative performance and CJ pressures of new explosives. A method is described whereby the plate dent technique is used to estimate the yield strength of a material. Yield strengths of steel, aluminum, beryllium, lead, and Tuballoy are examined. (ERA citation 06:008098)

19C. Combat Vehicles

AD-A094 627/7 PC **A03**/MF **A01**
Harry Diamond Labs., Adelphi, MD.
XM-1 Tank EMP Susceptibility and Survivability Test Program and Plan.
Technical memo.,
Andrew A. Cuneo, Jr. Nov 80, 39p Rept no. HDL-TM-80-25

This document describes in detail the test approach, functional tests, support requirements, safety procedures, instrumentation, simulators, and specific test procedures necessary to determine susceptibility and survivability of the XM-1 tank to a simulated nuclear electromagnetic pulse environment. The approach is designed to give high confidence level results with a test sample of one. It incorporates simulator illumination, electromagnetic scale modeling, and cable driving technology. (Author)

19D. Explosions, Ballistics, and Armor

AD-A094 817/4 PC **A06**/MF **A01**
Army Electronics Research and Development Command, White Sands Missile Range, NM. Atmospheric Sciences Lab.
Battlefield Dust and Atmospheric Characterization Measurements during West German Summertime Conditions in Support of Grafenwoehr Tests.
Technical rept.,
James D. Lindberg, Radon B. Loveland, Melvin G. Heaps, James B. Gillespie, and Andrew F. Lewis. Sep 80, 108p Rept no. ERADCOM/ASL-TR-0066

This report describes the results of an attempt to characterize the aerosol generated by 155 mm artillery projectile explosions by directly instrumenting the expected impact area. Cascade impactors, filter samplers and a particulate spectrometer were used to determine particulate composition and size distribution. From the resulting data which are presented here, calculation of mass loading and visible and infrared wavelength extinction were made and are included. These results are unique in that they show the effect of projectile explosions just a few feet away from the instrumentation with a time resolution of 1 second. Mass loadings as high as 2 gm/m were detected; extinction was not significantly wavelength dependent. The conclusion was that one can, as a practical matter, directly instrument the impact area during artillery barrage firings with an acceptable, though not trivial, risk to equipment. The test was conducted at an artillery training area near Grafenwoehr, Germany, in June 1979. A description of the meteorological situation is included. (Author)

AD-A095 122/8 PC **A04**/MF **A01**
Belytschko (Theodore B.), Winnetka, IL.
Methods of Force Identification for Earth Penetrators.
Final rept. 1 Jul 76-1 Dec 77,
T. B. Belytschko. 1 Jan 80, 57p DNA-5289F
Contract DNA001-76-C-0167

A procedure is developed for identifying the forces on the nose of a penetrator vehicle from strain time histories at selected points in the vehicle in off-normal impact of the vehicle. The vehicle nose is idealized as a rigid body, the remainder as a deformable rod. The following forces are considered: axial forces, transverse forces in two planes, and bending moments. The deformation response of the vehicle is assumed to be linear. The identification is separated into the identification of the flexural forces and axial forces. (Author)

19E. Fire Control and Bombing Systems

AD-A094 705/1 PC **A10**/MF **A01**
Boeing Military Airplane Co., Seattle, WA.
Integrated Strike Avionics Study. Volume I.
Final rept. 6 Aug 79-22 Sep 80,
Harry R. Fox, G. L. Heiser, F. M. Kim, R. L. Kinnaman, and M. R. Wallace. Oct 80, 225p D180-26023-1, AFWAL-TR-80-1145-VOL-1
Contract F33615-79-C-1932

This document reports the results of the integrated strike avionics study (ISAS). Advanced fire control concepts emphasing the modular integration of current and emerging sensors and reduced crew workload were formulated and evaluated. A preferred system concept embodying the best features of the systems evaluated consisted of a Ku-SAR multimode radar, FLIR and Silicon TV EO sensors and a 3D Target Classifier. The mechanization was automatic with crewman participation. Post-autocuer/autoclassifier integration of sensors, manual-automatic mechanization of concepts, and improved terminal weapon guidance were recommended. (Author)

AD-A094 767/1 PC **A15**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Comparison of Three Extended Kalman Filters for Air-to-Air Tracking.
Master's thesis,
William H. Worsley. Dec 80, 348p Rept no. AFIT/GAE/AA/80S-2

The performances of the extended Kalman filter implementations for three different target acceleration models that estimate target position, velocity, and acceleration states for air-to-air gunnery were compared. The models included (1) a first order zero-mean Gauss-Markov relative target acceleration model, (2) a first order zero-mean Gauss-Markov total target acceleration, and (3) a constant turn rate target acceleration model. Measurements available to the extended Kalman filter at update were the range, range rate, and the error angles between the true line of sight and the estimated line of sight. Additional evaluations of the effect of variations in the length of the sample period and the effect of variations in the variances of the measurement noises were conducted for the extended Kalman filter using the constant turn rate target acceleration model. All evaluations were accomplished using Monte Carlo simulation techniques. (Author)

19F. Guns

AD-A094 711/9 PC **A02**/MF **A01**
Army Armament Research and Development Command, Watervliet, NY. Large Caliber Weapon Systems Lab.
Elastic-Plastic Analysis Using a Triangular Ring Element in NASTRAN.
Technical rept.,
P. C. T. Chen. Nov 80, 22p ARLCB-TR-80045, AD-E440 104
Presented at the NASTRAN Users' Colloquium (9th), Kennedy Space Center, FL. 21-23 Oct 80.

An elastic-plastic triangular ring element is implemented in the NASTRAN computer program. The plane-strain problem of a partially-plastic thick-walled cylinder under internal pressure is solved and compared with the earlier finite-difference solution. A very good agreement has been reached. In order to demonstrate its application to more general problems, an overloaded thread problem for the British Standard Buttress is examined. The maximum axial and principal stresses are located and their values are determined as functions of loading.

AD-A094 821/6 PC **E19**/MF **E19**
Johns Hopkins Univ., Laurel, MD. Chemical Propulsion Information Agency.
JANNAF Combustion Meeting (17th) Held at Hampton, Virginia, 22-26 September 1980. Volume II,
Debra Sue Eggleston. Nov 80, 589p Rept no. CPIA-PUB-329-VOL-2
Contract N00024-78-C-5384
See also Volume 3, AD-B054 546.
Availability: Chemical Propulsion Information Agency, Johns Hopkins Road, Laurel, MD 20810 (No copies furnished by DTIC).

This volume, the second of four volumes, contains the unclassified papers on combustion of gun and nitramine propellants. Subjects, discussed include gun charge designs, flame spreading in granular and stick charges, muzzle flash, ignition and combustion of liquid propellant for guns, laminar flames, decomposition and combustion of nitramine ingredients, and nitramine propellant development. The volume contains subject, personal author, and corporate source indexes. (Author)

19G. Rockets

AD-A094 710/1 PC **A10**/MF **A01**
Boeing Aerospace Co., Huntsville, AL.
Propulsion Noise Reduction Technology Program.
Final rept. Apr 79-Sep 80,
Charles R. Carter, and Jerrold H. Arszman. 7 Nov 80, 212p D256-10948, DRSMI/RK-CR-81-2, AD-E950 079
Contract DAAK40-79-C-0108

This report describes the design, test and analysis of several types of suppressors being developed for reducing the peak noise produced by a shoulder-fired rocket weapon system. Each suppressor design was tested with an actual firing of the M-72 weapon system. A reusable M-72 launch tube was suspended on a ballistic pendulum and each suppressor was attached to the launch tube for testing. Instrumentation for determining missile muzzle velocity, launch tube recoil and near field noise were installed and recorded during each test. The results of the tests have verified that an aluminum baffled cylinder suppressor will reduce the peak noise produced at the gunners position by the M-72 weapon system from 2.14 psid/177.5 db to 0.46 psid/164 db. This 78.5% peak noise overpressure reduction was achieved with no effect on missile muzzle velocity and at a launcher recoil level of 2.86 lb-sec. Launcher recoil was reduced to near zero by using yielding baffles in the suppressor. This configuration produced a peak noise overpressure reduction at the gunners position of 76.6%. Extensive testing was done with fabric suppressors to determine their potential for fieldweight suppressors. The fabric suppressors attained a peak noise overpressure reduction of 75% but increased the recoil level to 5 lb-sec. Design modifications have been recommended for reducing this recoil level. Projected carry weight for the fieldweight suppressor for the M-72 weapon has a range of 0.5 and 2.5 pounds for the fabric and aluminum suppressors respectively depending on the peak noise reduction and launcher recoil levels desired. (Author)

20.
PHYSICS

20A. Acoustics

AD-A094 749/9 PC **A03**/MF **A01**
Naval Ocean Systems Center, San Diego, CA.

Applications of Statistical Distributions in Acoustic Model Evaluation (Log-Gamma Probability Density and Distribution Curves are Presented as Graphical Aids in Assessing the Statistical Character of Propagation Loss Data).
Technical document,
R. W. McGirr. 1 Jul 80, 45p Rept no. NOSC/TD-387

Computer graphics have been incorporated into a model evaluation software package that is intended to provide insight into the statistics of propagation loss. Specifically, the user may optionally superimpose plots of theoretical distribution curves on empirical distribution displays. A tutorial review of the gamma distribution is presented in the context of multipath fluctuations, followed by a comprehensive discussion of the log-transformed gamma distribution. An example is included to illustrate the application of the maximum likelihood method of parameter estimation. (Author)

AD-A094 834/9 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
The Design and Analysis of a Unique Broadband Underwater Acoustic Source.
Interim rept.,
A. Mark Young. 13 Jan 81, 19p Rept no. NRL-8435

The design, development, and analysis of a unique type of underwater acoustic are discussed. The transducer is in the form of a linear array of discrete elements and is required to have a constant transmitting voltage response and carefully controlled directivity characteristics over a two-octave bandwidth. A generalized model of linear array of cylindrical piezoelectric ceramic acoustic radiators is developed and applied to the design of a prototype which operates over approximately half of the required bandwidth. The prototype transducer was built, and the measured results are compared with those predicted by the model. Recommendations are made for improving the performance of both the prototype and the array required to meet the full specified bandwidth. (Author)

AD-A094 984/2 PC **A05**/MF **A01**
Naval Postgraduate School, Monterey, CA.
Propagation of Sound in a Fast Bottom Underlying a Wedge-Shaped Medium.
Master's thesis,
Norine A. Bradshaw. Sep 80, 83p

The pressure and phase distribution of sound in a fast fluid medium underlying a tapered fluid medium was modeled using a Green's function approach. The model predicted well-defined beams in the bottom, with apparent interference effects strongly evident for cases at a distance from the wedge interface. The effects of attenuation on the patterns were studied. A simple expression for determining the beam depression angle as a function of the wedge angle, the sound speed ratio, and the density ratio was derived. Comparisons with laboratory measurements were made.

AD-A094 995/8 Not available NTIS
SACLANT ASW Research Centre, La Spezia (Italy).
Spatial Correlation of Surface-Generated Noise in a Stratified Ocean,
William A. Kuperman, and Frank Ingenito. 8 May 79, 14p Rept no. SACLANTCEN-SR-41
Availability: Pub. in Jnl. of the Acoustical Society of America, v67 n6 p1988-1996 Jun 80 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A095 060/0 PC **A04**/MF **A01**
CACI, Inc.-Federal, Arlington, VA.
INM, Integrated Noise Model, Version 2. Installation Instructions,
Mary Catherine Flythe. Jan 81, 64p FAA/EE-80-50
Contract DOT-FA79WA-4295
See also Rept. no. FAA-AEE-79-10 dated Sep 79, AD-A079 622.

This document provides the necessary instructions for programming personnel to install Version 2.7 of the Integrated Noise Model (INM) on the CDC 6000, Cyber 170 or IBM S/360-370 computers. The manual describes the model history, the model components, the hardware and software requirements, the characteristics of the model release tapes, the installation procedures and the execution procedures. The instructions contained within this manual apply to INM Version 2.7 magnetic tapes released after January 1, 1981. The installation instructions for CDC compatible tapes released between September 1979 and January 1981 are contained in 'INM, Integrated Noise Model, Version 2 - Programmer's Guide' (Report No. FAA-EE-79-10). (Author)

N81-16851/0 PC **A09**/MF **A01**
United Technologies Research Center, East Hartford, CT.
Refraction and Scattering of Sound by a Shear Layer.
Final Report.
R. H. Schlinker, and R. K. Amiet. Dec 80, 192p NASA-CR-3371
Contract NAS1-15339

The angle and amplitude changes for acoustic waves refracted by a circular open jet shear layer were determined. The generalized refraction theory was assessed experimentally for on axis and off axis acoustic source locations as source frequency varied from 1 kHz to 10 kHz and free stream Mach number varied from 0.1 to 0.4. Angle and amplitude changes across the shear layer show good agreement with theory. Experiments confirm that the refraction theory is independent of shear layer thickness, acoustic source frequency, and source type. A generalized theory is, thus, available for correcting far field noise data acquired in open jet test facilities. The effect of discrete tone scattering by the open jet turbulent shear layer was also studied. Scattering effects were investigated over the same Mach number range as frequency varied from 5 kHz to 15 kHz. Attenuation of discrete tone amplitude and tone broadening were measured as a function of acoustic source position and radiation angle. Scattering was found to be stronger at angles close to the open jet axis than at 90 deg, and becomes stronger as the acoustic source position shifts downstream. A scattering analysis provided an estimate of the onset of discrete tone scattering.

20B. Crystallography

AD-A094 671/5 PC **A02**/MF **A01**
New Jersey Inst. of Tech., Newark.
Mercury Cadmium Telluride Sputtering Research.
Annual technical rept.,
Roy H. Cornely. 1 Jun 80, 18p AFOSR-TR-81-0106
Grant AFOSR-77-3249

Improved as-deposited mobility values for rf triode-sputtered thin films of (HG,Cd)Te, with 25 mole percent CdTe, were obtained by increasing the Hg vapor pressure and the temperature of the single crystal CdTe and Si substrates. Films on single crystal (111) oriented CdTe substrates had the highest as-deposited electron mobility, as determined by four-point probe Hall-effect measurements; values of 2200 and 3720 cm squared per volt sec. with carrier concentrations of 5 and 2.8 times ten to the sixteenth per inverse cubic cm we obtained as 296 and 89 degree Kelvin respectively. Using unoptimized procedures, it was shown that the n-type mobility could be appreciably increased. Films with complete (111) crystal orientation and composition of bulk crystals with the same mole percent of CdTe (x value) as that for the pressed-powder targets (made from a mixture of HgTe and CdTe powders) were obtained for x values of 0.1, 0.18, 0.23, and 1.0. ESCA revealed that films with a mixture of (311) and (111) crystal orientations and submicron grain size were deficient in Hg. A nonlinear IV characteristic was measured for a sputtered heterojunction structure. (Author)

CEGB-RD/B/N-4695 PC **A02**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
Point Defect Relaxation Volumes for Copper.
K. M. Miller. Nov 79, 17p
U.S. Sales Only.

The methods used for the determination of point defect relaxation volumes are discussed and it is shown that a previous interatomic potential derived for copper is inaccurate and results obtained using it are invalid. A new interatomic potential has been produced for copper and a computer simulation of point and planar defects carried out. A vacancy relaxation volume of -0.33 atomic volumes has been found with interstitial values in the range 1.7 to 2.0 atomic volumes. It is shown that these values in current theories of irradiation induced swelling lead to an anomalously high value for dislocation bias compared with that determined experimentally. (Atomindex citation 11:546501)

PB81-159261
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Geology.
Geometry of the Diffraction in Gandolfi Camera,
Zhang Zhenyu. 9 Jan 80, 8p
Included in Scientia Sinica, v23 n10 p1278-1285 Oct 80.

In this paper the author describes the diffraction principles of the Gandolfi camera, deduces the equation for correcting its intensity of diffraction, interprets to some extent various phenomena in the Gandolfi diffraction patterns, and suggests the directions and measures to improve the Gandolfi camera.

20C. Electricity and Magnetism

AD-A094 933/9 PC **A04**/MF **A01**
Naval Academy, Annapolis, MD. Dept. of Applied Science.
Magnetic Fields of a Horizontal Electric Dipole in a Semi-Infinite Medium.
Final rept. Jun 79-Aug 80,
L. K. Chi, B. R. Hood, and F. A. Skove. Aug 80, 72p Rept no. USNA-AS-1-80

Various formulae for magnetic fields of horizontal electric dipoles in a semi-infinite medium have been derived. In the interest of providing the ability to evaluate the magnetic field strength interactively at on-site field locations, reduced expressions, which are valid in the quasi-static range, for the magnetic field were used in developing computer generated plots. Existing expressions were used to plot the field strength for AC and point DC dipoles with the receiver either in the medium or above the medium. In order to plot the special case of a finite length DC dipole with the receiver above the medium, the reduced expressions had to be derived. These new expressions, in addition to agreeing with Kraichman's point dipole expressions which are valid at a distance, also are valid with the receiver directly above the source. (Author)

20D. Fluid Mechanics

AD-A094 626/9 PC **A02**/MF **A01**
Stanford Univ., CA. Joint Inst. of Aeronautics and Acoustics.
Basic Studies of Multiple Jets and Wall Jets.
Status Rept. Jul 79-Aug 80,
A. Krothapalli. Aug 80, 23p AFOSR-TR-81-0033
Contract F49620-79-C-0189

An experimental investigation of the flow field of an underexpanded rectangular jet issuing from a rectangular nozzle of aspect ratio 16.7 was undertaken. Tests were conducted for pressure ratios (settling chamber pressure/ambient pressure) ranging from 1.6 to 5.8. For pressure ratios greater than 1.9 the spectrum of the hot wire and microphone signals placed in the near field of the jet show discrete frequencies generally known as screech tones. At a pressure ratio of 3.7, Schlieren pictures show a distinct double wave pattern with their source bing located at about 6 widths downstream. This results in an enhanced spreading of the jet as

compared with other pressure ratios. A series of experiments on unconfined multiple jets has been performed for pressure ratios ranging from 1.6 to 3.7. Schlieren pictures were obtained which shows that the individual jets do not attract each other and mixing with the ambient air (or secondary air) takes place quite independently. The importance of sound waves (generated in one of the jets) acting upon the neighboring jets is demonstrated. Using this technique, it is shown that the mixing can be enhanced. (Author)

AD-A094 735/8 PC **A03**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Flow Characteristics in a Channel Following Exit of Incident Shock Wave.
Master's thesis,
Ralph H. Tate, III . Dec 80, 50p Rept no. AFIT/GAE/AA/80D-20

Dynamic variations in pressure occurring within shock tube channels following the exit of an incident shock wave were investigated. Three channel sizes were investigated. The first size was 4 in by 8 by 48 in (10.16 cm by 20.32 cm by 1.22 m), the second size was 4 in by 1 in by 25 in (10.16 cm by 2.54 cm by 63.5 cm), and the third size was 1 in by 1 in by 44 in (2.54 cm by 2.54 cm by 1.12 m). For the first and second channels, the shock tube diaphragm pressure ratio, P sub 41 ranged from 6.0 to 20.0. The third channel was used over a P sub 41 range of 8.0 to 20.0 and also to determine the presence of transverse waves due to an area reduction in the shock tube. The first channel, having the same cross-sectional area as the shock tube, exhibited pressures which approximated simple shock tube theory results. The second and third channels exhibited complex pressure changes which consistently peaked at the same time after the shock wave passed the pressure sensors, independent of P sub 41.

AD-A094 776/2 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Turbulent Shear Flow Velocity Profiles Behind a Grid of Parallel Rods of Variable Spacing.
Master's thesis,
Thomas N. McKnight, Jr. Dec 80, 100p Rept no. AFIT/GAE/AA/80D-15

An experimental study was conducted to investigate the turbulent shear flow velocity profiles generated by a parallel-rod grid with adjustable spacing designed to produce an artificial boundary layer. The study was conducted in a low turbulence wind tunnel with a 9 x 9 x 37 inch test cabin. Data was collected using a hot-wire anemometer in conjunction with a correlator. The turbulence parameters reported are the development and distribution of mean velocities, fluctuating velocities, Reynolds stresses, microscales and integral scales at 32, 112, and 232 rod diameters downstream of the grid. Results show that stable power-law velocity profiles can be generated with negligible diffusion of the shear layer along the length of the test cabin. Turbulence intensity plots show that 75% of the grid generated turbulence decayed within 100 rod diameters downstream from the grid. The microscale and integral scales showed their minimum values close to the grid and increased in value downstream. Also, the ratio of the spatial integral scale to the spatial microscale was approximately 3.0 throughout the test cabin. (Author)

AD-A095 063/4 PC **A04**/MF **A01**
Air Force Academy, CO.
Measurement of Canard Wakes.
Final rept. 1 Oct 79-30 Sep 80,
G. Sisson, and R. Crandall. 2 Feb 81, 51p Rept no. USAFA-TN-81-1
See also Rept. no. USAFA-TR-80-17 dated Oct 80, AD-A093 378.

This technical note consists of two separate papers. The first covers the manufacture and calibration of miniature seven hole probes. The second paper covers the flow field data collection and presentation. Together, the two papers describe the entire process developed to quickly and economically measure the flow field properties in canard model wakes. The first paper describes a method for measuring local direction and total and static pressures of a flow by means of a fixed probe, provided that the local air flow does not make an angle of more than 80 degrees with the axis of the probe. Rapid surveys of the wakes formed behind variously-configured lifting body models during wind tunnel testing require such a probe. The probe is easily manufactured from standard-sized tubing materials. The power series calibration method used with the probe results in explicit polynomial expressions for the desired aerodynamic properties. The calibration method is easily programmed on a data acquisition system. This paper includes an example of a complete incompressible calibration and discusses a logical method for extending the calibration technique to compressible flows. (Author)

AD-A095 114/5 PC **A04**/MF **A01**
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
Confined Mixing of Coaxial Flows (Melange d'Ecoulements Coaxiaux dans des Conduits).
Aeronautical rept.,
R. A. Tyler, and R. G. Williamson. Oct 80, 72p DME-LR-602, NRC-18831
Summary in French.

An empirical approach is used to correlate the mixing of isothermal incompressible coaxial air flows in straight pipes of constant circular cross-section. An assumed decay function for kinetic momentum is correlated in terms of initial geometry and initial velocities of the mixing streams. The method allows the rapid estimation of quantities of engineering interest including the axial distribution of both static pressure and total momentum. The method has been tested against published data on thrust augmenting ejectors of the parietal type, and found to provide satisfactory reproduction of measured performance as affected by mixing pipe length and area ratio.

AECL-6526 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Dynamic Model of Gas Flow in a Non-Uniform Pipe.
S. Mensah, and R. M. Lepp. Aug 79, 6p CONF-790726-4
Summer computer simulation conference, Toronto, Ontario, Canada, Jul 1979.
U.S. Sales Only.

A gas-line model, based on the analysis of compressible flow with friction, has been developed to describe the dynamics of gas flow in a non-uniform line, i.e. one comprising segments of different lengths and diameters. Acoustic wave analysis was used in a novel way, by considering the line as a cascaded connection of uniform pipes separated by discontinuities. The transmission matrix representing this non-uniform line is the product of the matrices for each element in the system. To facilitate implementation of the theoretical model on a hybrid computer, modal approximatons to its transfer functions were derived. Both models were validated against experimental data. (Atomindex citation 11:529510)

N81-16414/7 PC **A04**/MF **A01**
Imperial Coll. of Science and Technology, London (England).
Measurements of Laminar and Turbulent Flow in a Curved Duct with Thin Inlet Boundary Layers.
Final Rept.,
A. M. K. P. Taylor, J. H. Whitelaw, and M. Yianneskis. Jan 81, 62p NASA-CR-3367, FS-80-29
Contract NASW-3258

Laser Doppler velocimetry was used to measure the laminar and turbulent flow in a 90 deg square bend of strong curvature. The boundary layers at the inlet to the bend were approximately 25 percent and 15 percent of the hydraulic diameter for the laminar and turbulent flows, respectively. The development of the pressure driven secondary motion is more rapid for laminar flow: the maximum cross stream component measured was 60 percent of the bulk velocity in contrast to 40 percent for turbulent flow. The streamwise isotachs show that, for laminar flow, large velocities are found progressively nearer to the outer radius of the bend and along the sidewalls. For turbulent flow, the isotachs move towards the inner radius until about 60 deg around the bend where strong secondary motion results in a similar redistribution. Turbulence level and shear stress measurements are also presented.

N81-16416/2 PC **A09**/MF **A01**
Lockheed Missiles and Space Co., Inc., Huntsville, AL.
Hyperbolic/Parabolic Development for the GIM-STAR Code.
Progress Rept.,
L. W. Spradley, J. F. Stalnaker, and A. W. Ratliff. Dec 80, 177p NASA-CR-3369, LMSC-HREC-TR-D697882
Contracts NAS1-15783, NAS1-15795

Flow fields in supersonic inlet configurations were computed using the eliptic GIM code on the STAR computer. Spillage flow under the lower cowl was calculated to be 33% of the incoming stream. The shock/boundary layer interaction on the upper propulsive surface was computed including separation. All shocks produced by the flow system were captured. Linearized block implicit (LBI) schemes were examined to determine their application to the GIM code. Pure explicit methods have stability limitations and fully implicit schemes are inherently inefficient; however, LBI schemes show promise as an effective compromise. A quasiparabolic version of the GIM code was developed using elastical parabolized Navier-Stokes methods combined with quasitime relaxation. This scheme is referred to as quasiparabolic although it applies equally well to hyperbolic supersonic inviscid flows. Second order windward differences are used in the marching coordinate and either explicit or linear block implicit time relaxation can be incorporated.

N81-16417/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Capillary and Acceleration Wave Breakup of Liquid Jets in Axial-Flow Airstreams.
R. D. Ingebo. Jan 81, 13p NASA-TP-1791, E-537

Empirical correlations of reciprocal mean drop diameter with airstream momentum were derived from capillary and acceleration wave breakup of liquid jets atomized by cross stream injection into axial flow airstreams. A scanning radiometer was used to obtain data over an airstream momentum range of 3.7 to 25.7 g/sq cm sec. Transition from capillary to acceleration wave breakup was obtained at a critical Weber-Reynolds number of 1,000,000.

N81-16419/6 PC **A03**/MF **A01**
Concordia Univ., Loyola Campus, Montreal (Quebec). Dept. of Mechanical Engineering.
Experiments on the Stability of Converging Cylindrical Shock Waves.
J. H. T. Wu, R. A. Neemeh, and P. P. Ostrowski.
1 Aug 80, 26p LOG-J11846
Backup Document for Aiaa Synoptic Scheduled for Publication to Aiaa Journal, Mar. Or Apr. 1981.

A shock tube which employs a series of conical contractions to direct a plane, annular incident shock wave into a cylindrical implosion chamber was used for an incident shock Mach number as low as 1.79. Highly symmetrical implosions at early times were achieved although an eventual breakdown in shock front curvature was always noted at small radius regardless of the initial Mach number. The cylindrical shock Mach number variation and trajectory was found to be well predicted by the Chester-Chisnell-Whitham (CCW) area Mach number relation. Spark shadowgraph photography was used to demonstrate the inherent instability of converging cylindrical shocks by introducing obstacles in the path of the shock, upstream and downstream of the conical contractions. Whitham's ray shock theory was applied to provide an insight into the mechanism of instability associated with perturbed converging shocks. It is shown that a breakdown in shock front curvature is a natural and necessary consequence of initial asymmetries and that this instability phenomenon is signaled by the appearance of clockwise and counter clockwise rotating vortex pairs during the later diverging shock motion.

N81-16420/4 PC **A06**/MF **A01**
City Coll., New York.
Theory of Strong Turbulence by Renormalization.
Final Technical Rept., 15 Jan. 1978 - 14 Jan. 1981.
C. M. Tchen. 22 Jan 81, 121p NASA-CR-163871
Grant NSG-1485

The hydrodynamical equations of turbulent motions are inhomogeneous and nonlinear in their inertia and force terms and will generate a hierarchy. A kinetic method was developed to transform the hydrodynamic equations into a master equation governing the velocity distribution, as a function of the time, the position and the velocity as an independent variable. The master equation presents the advantage of being homogeneous and having fewer nonlinear terms and is therefore simpler for the investigation of closure. After the closure by means of a cascade scaling procedure, the kinetic equation is derived and possesses a memory which represents the nonMarkovian character of turbulence. The kinetic equation is transformed back to the hydrodynamical form to yield an energy balance in the cascade form. Normal and anomalous transports are analyzed. The theory is described for incompressible, compressible and plasma turbulence. Applications of the method to problems relating to sound generation and the propagation of light in a nonfrozen turbulence are considered.

PB81-155731 Not available NTIS
National Bureau of Standards, Washington, DC.
Numerical Modeling of Swirling Laminar Orifice Flow.
Final rept.,
R. W. Davis, and E. F. Moore. 1980, 6p
Pub. in Proceedings of the IMEKO Symposium on Flow Measurement and Control in Industry, Tokyo, Japan, November 13-16, 1979, p81-86 1980.

The objective of this study is to investigate the effects of axisymmetric swirl on the performance of concentric orifice meters operating in the laminar flow regime. A computer code, TEACH, developed at Imperial College, London and modified at the National Bureau of Standards is used to predict the performance of a variety of these orifice meters under laminar flow conditions with inlet swirl numbers up to 50. The parameters investigated are inlet swirl and axial velocity distributions, Reynolds number, and orifice plate thickness and hole diameter. It is seen that increasing swirl number results in decreasing values for the various orifice meter discharge coefficients. At the higher values of swirl number, a vortex breakdown zone forms at the inlet to the computational test section and, at the greatest swirl numbers, extends through the orifice meter itself. Salient features of the flowfield, such as the extent of the recirculation zone behind the orifice plate, are tabulated. In order to demonstrate the accuracy of the program under at least the simplest of circumstances, numerical predictions for swirl decay down a straight pipe are shown to compare well with an analytical solution. It is concluded that swirl effects on orifice meters can be substantial and that an investigation such as this for the more realistic situation of non-axisymmetric swirl at high Reynolds numbers would be very useful.

PB81-155749 Not available NTIS
National Bureau of Standards, Washington, DC.
A Numerical-Experimental Study of Parshall Flumes.
Final rept.,
R. W. Davis, and S. Deutsch. 1980, 18p
Pub. in Jnl. Hydraulic Research 18, n2 p135-152 1980.

Parshall flumes are commonly used devices for the measurement of flow rates in open channels such as sewers and irrigation ditches. The operation of these flumes in 'nonstandard' situations, such as when faced with distorted upstream velocity profiles or when placed in sloping channel beds, is poorly understood. This paper presents numerical solutions for the flow through Parshall flumes utilizing a three-dimensional, free-surface finite difference code. The effects on flume operation of channel slope, upstream velocity profile distortions, and flume geometry changes are assessed. Experimental results are obtained for a Parshall flume with a 15.2 cm (6 in.) throat width. Experimental and numerical data on important features of the flume flowfield are seen to compare well.

PB81-159220
(Order as PB81-159196, PC **A07**/MF **A01**)
Academia Sinica, Beijing (China). Inst. of Acoustics.
Experimental Investigations on Shock-Associated Noise,
Ma Dayou, Li Peizi, Dai Genhua, and Wang Hongyu. 2 Feb 80, 10p
Included in Scientia Sinica, v23 n10 p1237-1246 Oct 80.

Shock-associated noise produced from a choked airjet is experimentally investigated. It is found that the sound fields and spectra produced by the jet vary widely with different nozzles and pressure ratios due to shock associated noise, which exists when pressure ratio lies between 2 and 8. But the overall sound pressure level starts to deviate from that given by turbulent noise alone at the pressure ratio R = 2, rises rapidly by some 20 dB at a little over R = 3 and remains there nearly as a constant until R = 8.5, and after that it rises again according to the rule of turbulent noise. New formulae of screech frequency and peak frequency of wide-band shock-associated noise are also given, agreeing better with experimentation. Significant dip or dips are found on the frequency spectra of the composite jet noise in certain range of pressure ratio, and this seems possible to offer an explanation based on the interference effect between wide-band shock-associated noise and turbulent noise. It is also shown that no such phenomenon occurs in the direction of 90 degrees from the jet.

20E. Masers and Lasers

AD-A094 722/6 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Analysis of Modes in an Unstable Strip Laser Resonator.
Master's thesis,
James E. Rowley. Dec 80, 156p Rept no. AFIT/GEP/PH/80D-7

The mode eigenvalue equation for an unstable strip laser resonator is developed from scalar diffraction theory. The field distributions are expressed as a series and the integral is then evaluated using a first order approximation to the method of stationary phase. The resulting approximate closed form is rearranged to form an eingenvalue polynomial, the roots of which are the mode eigenvalues. Eigenfunction expressions are then developed using second order approximation to the method of stationary phase. Modifications to these expressions are then made to account for the presence of uniform gain in the resonator. The results of a computer program using the derived expressions are presented. Comparisons to previously published results are made for the bare cavity case, and results for the loaded cavity case follow. (Author)

AD-A094 760/6 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Iodine Dissociation in a Shock Tube.
Master's thesis,
Lawrence C. Farnell. Dec 80, 61p Rept no. AFIT/GAE/AA/80D-5

A two-in. (5.08 cm) I.D. circular shock tube was assembled to study the dissociation of iodine. This study was an initial investigation into the possible use of shock waves to dissociate iodine in an electronically excited state. Iodine has an emission transition in this state at a wavelength of 1,315 micron which is used in the iodine laser. Using argon as the diluent gas, tests were observed with an indium-antimonide detector to determine if emissions in the 1.1 to 5.5 micron range of the detector were present. Tests with and without iodine were conducted at a Mach number of approximately 2.5 with reflected shock wave temperature of about 1570 K. comparison of these tests indicates that a significant infrared emission from iodine was present in the detector range. The presence of the 1.315 micron transition cannot yet be confirmed in that three iodine transitions exist in the given range, other emissions from unknown sources could be present, and the detector bandwidth could not be suitably narrowed. Further research is required to specifically identify the spectrum of IR present. (Author)

AD-A094 919/8 PC **A02**/MF **A01**
Rochester Univ., NY. Dept. of Physics and Astronomy.
Effect of Backscattering on the Behavior of a Dye Ring Laser,
Rajarshi Roy, and L. Mandel. 22 Jul 80, 3p
AFOSR-TR-81-0011
Grant AFOSR-81-0026
Pub. in Jnl. of Optics Communications, v35 n2 p247-248 Nov 80.

No abstract available.

AD-A094 925/5 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.
A Free-Electron Laser Pump Produced by Magnetic Diffusion,
K. D. Jacobs, R. E. Shefer, and G. Bekefi. 16 Jun 80, 4p AFOSR-TR-81-0105
Grants AFOSR-77-3143, NSF-ENG79-07047
Pub. in Applied Physics Letters, v37 n7 p583-585, 1 Oct 80.

No abstract available.

AD-A095 010/5 PC **A06**/MF **A01**
Naval Postgraduate School, Monterey, CA.
Aerodynamic Stabilization of an Electrical Discharge for Gas Lasers.
Master's thesis,
Charles Herbert Davis. Sep 80, 105p

This work reports on a study of a subsonic, turbulent, diffuse discharge with potential application to electric discharge convection lasers. Two methods of turbulence generation have been investigated; namely, a pulsed-jet ejector and a plate generator. Power inputs for various flow conditions are reported. Turbulence spectra for these flow conditions have been studied and an effort made to optimize the discharge stabilizing properties of the flow. Plate generated turbulence proved superior for stabilizing the discharge. (Author)

DOE/DP/40115-1 PC **A15**/MF **A01**
Mathematical Sciences Northwest, Inc., Bellevue, WA.
Conceptual Design of a KrF Scaling Module. Final Report.
Oct 80, 330p
Contract AC08-79DP40115

A conceptual design of an angular multiplexed 50 kJ KrF laser module for Inertial Confinement Fusion is presented. Optical designs for encoding, beam packing and beam transfer between amplifier stages are developed; emphasis is placed on reducing prepulse problems and achieving acceptable optical quality. An axisymmetric optical design is identified as optimum in terms of simplicity, optical quality, cost and alignment. A kinetic code model was developed for the KrF amplifier and was used to derive scaling maps for the 50 kJ module. Attention was given to reducing parasitics, achieving acceptable extraction efficiency and accounting for amplified spontaneous emission effects. The size of the module is constrained by parasitic suppression and damage thresholds; the power gain is constrained by demanding 40% extraction efficiency in a double pass extraction geometry; and, the run time is constrained by the pulsed power technology (PFN or PFL) and acceptable values of g sub 0 L. The bounds imposed on the design by the pulsed power technology were examined. Both PFLs and PFNs were considered along with their associated diode, hibachi and guide field requirements. A base line design for a 50 kJ module including amplifier staging, layout and overall size is discussed. Cost analysis and scaling for optical components, pulsed power technology and the guide field are also presented. (ERA citation 06:008482)

DOE/ET/33030-T1 PC **A04**/MF **A01**
Bell Aerospace Textron, Buffalo, NY.
Sixteen Micron Chemical Laser Study. Final Technical Report, October 1977-July 1978.
J. A. Blauer, and R. G. Shortridge. Jul 78, 55p
Contract AC02-78ET33030

Experimental data are presented relative to attempts to induce laser oscillations in the 16 mu m spectral region on the rotation vibrational transitions of the BrF molecule. The chemical system of interest is presented. Although this investigation involved the use of three electrically discharged flow tube devices, a photolytically pumped device, and a shock tube to initiate the production of fluorine atoms, no laser emission from BrF was detected in repeated testing. This evidence, together with the results of kinetic modeling calculations based on the BLAZE II computer code and the latest compilation of the rate parameters pertinent to the Br sub 2 -F sub 2 system, suggest that a Boltzmann vibrational energy distribution of BrF (v less than or equal to 7) is produced in the F + Br sub 2 and F + BrI pumping reactions. (ERA citation 06:008063)

N81-16437/8 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Solar-Pumped Gas Laser Development.
J. W. Wilson. Dec 80, 66p NASA-TM-81894

A survey of gas properties through detailed kinetic models led to the identification of critical gas parameters for use in choosing appropriate gas combinations for solar pumped lasers. Broadband photoabsorption in the visible or near UV range is required to excite large volumes of gas and to insure good solar absorption efficiency. The photoexcitation density is independent of the absorption bandwidth. The state excited must be a metastable state which is not quenched by the parent gas. The emission bandwidth must be less than 10 A to insure lasing threshold over reasonable gain lengths. The system should show a high degree of chemical reversibility and an insensitivity to increasing temperature. Other properties such as good quantum efficiency and kinetic efficiency are also implied. Although photoexcitation of electronic vibrational transitions is considered as a possible system if the emission bands sufficiently narrow, it appears that photodissociation into atomic metastables is more likely to result in a successful solar pumped laser system.

PAT-APPL-6-083 508 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
XeCl Avalanche Discharge Laser Employing Ar as a Diluent.
Patent Application,
R. C. Sze. Filed 10 Oct 79, 10p
Contract W-7405-ENG-36
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A XeCl avalanche discharge exciplex laser which uses a gaseous lasing starting mixture of: 0.2 to 0.4% chlorine donor/2.5% to 10% Xe/97.3% to 89.6% Ar) is provided. The chlorine donor normally comprises HCl but can also comprise CCl sub 4 BCl sub 3 . Use of Ar as a diluent gas reduces operating pressures over other rare gas halide lasers to near atmospheric pressure, increases output lasing power of the XeCl avalanche discharge laser by 30% to exceed KrF avalanche discharge lasing outputs, and is less expensive to operate. (ERA citation 06:005185)

PAT-APPL-6-102 470 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Electron Beam-Switched Discharge for Rapidly Pulsed Lasers.
Patent Application,
L. D. Pleasance, J. R. Murray, J. Goldhar, and L. P. Bradley. Filed 11 Dec 79, 27p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method and apparatus are designed for electrical excitation of a laser gas by application of a pulsed voltage across the gas, followed by passage of a pulsed, high energy electron beam through the gas to initiate a discharge suitable for laser excitation. This method improves upon current power conditioning techniques and is especially useful for driving rare gas halide lasers at high repetition rates. (ERA citation 06:005180)

PB81-803868 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Hydrogen Fluoride and Deuterium Fluoride Lasers. 1976-1980 (Citations from the NTIS Data Base).
Rept. for 1976-80.
Feb 81, 198p
Supersedes PB80-803273, and NTIS/PS-78/1307. See also 1964-1975, NTIS/PS-77/1167.

The chemical reactions, molecular interactions, kinetics, and quantum mechanics in hydrogen fluoride and deuterium fluoride laser development are cited. Studies on excitation, optical equipment, gas mixtures, and window materials for these lasers are included. The spectral output, power, efficiency, applications, and performance of HF and DF 193 lasers are also covered. (This updated bibiography contains 193 citations, 33 of which are new enteries to the previous edition.)

PB81-804023 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Gallium Arsenide Lasers. 1964-1980 (Citations from the NTIS Data Base).
Rept. for 1964-80.
Feb 81, 214p
Supersedes PB80-803612, and NTIS/PS-78/1326.

The report covers the design, development, and applications of gallium arsenide lasers. Studies on band theory, optical modulators, emission spectra, optical pumping, tuning, and efficiency of these lasers are included. (This updated bibliography contains 205 citations, 10 of which are new entries to the previous edition.)

PB81-804031 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
X-Ray Lasers. 1969-1980 (Citations from the NTIS Data Base).
Rept. for 1969-80.
Feb 81, 108p
Supersedes PB80-803828, and NTIS/PS-79/0011.

Citations of Federally-funded research on the theory, design, development, testing, and output of X-ray lasers are presented. Studies on sources, excitation, amplification, pumping, tuning, and optimization of these lasers are included. (This updated bibliography contains 101 citations, 8 of which are new entries to the previous edition.)

PB81-804049 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Ultraviolet Lasers. 1966-1980 (Citations from the NTIS Data Base).
Rept. for 1966-80.
Feb 81, 240p
Supersedes PB80-803810, and NTIS/PS-79/0010.

Government-sponsored research on the design, development, theory, and diagnostics of ultraviolet lasers is cited. Studies on molecular reactions, electron transitions, excitation, tuning, and optical pumping of these systems are covered. Materials lasing in these wavelengths and optical equipment for these lasers are also included. (This updated bibliography contains 233 citations, 24 of which are new entries to the previous edition.)

PB81-804080 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Carbon Monoxide Lasers. 1964-1980 (Citations from the NTIS Data Base).
Rept. for 1964-80.
Feb 81, 233p
Supersedes PB80-803133, and NTIS/PS-78/1319.

The cited reports from a worldwide literature survey discuss the theory, design, performance, and calibration of various types of magnetometers. Only equipment studies are included; reports describing only applications or processing of data are generally excluded. (This updated bibliography contains 237 citations, 24 of which are new entries to the previous edition.)

PB81-804098 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Carbon Monoxide Lasers. 1978-1980 (Citations from the Engineering Index Data Base).
Rept. for 1978-80.
Feb 81, 163p
Supersedes PB80-803141, and NTIS/PS-78/1321.

Worldwide research on carbon monoxide laser excitation, plasmas, development, molecular reactions, equipment, optics, transitions, and gas mixtures are cited. Studies on optical pumping, gas dynamics, chemical reactions, kinetics, and performance are covered. (This updated bibliography contains 156 citations, 14 of which are new entries to the previous edition.)

20F. Optics

AD-A094 780/4 PC **A02**/MF **A01**
Hughes Research Labs., Malibu, CA.
Infrared Properties of Highly Transparent Solids.
Final rept. 1 Jul 78-1 Jul 80,
Morris Braunstein. 1 Jul 80, 8p AFOSR-TR-81-0094
Contract F49620-78-C-0094

The optical properties of highly transparent single crystals of KBr, KCl, CaF2 and BaF2 have been measured using laser calorimetric techniques and wavelength modulation spectroscopy techniques in the spectral range for 2.5 to 12 microns in cooperation with the University of California at Los Angeles (UCLA). Rich and varied absorption structures in the spectra were observed in all of the crystals enabling an identification of volume and surface absorption. Similar dominant bands are observed in many of the crystals indicating the presence of common impurities regardless of the crystal and origin of its growth. However, varied fine structure was observed in different crystals which are indicative of the individual characteristics of the chemistry of the crystal preparation. The measurements were performed in laboratory and dry nitrogen ambients and the physical absorption and desorption of surface contaminants was readily observed. Ellipsometric techniques were developed to evaluate and measure the strain and anisotropy in infrared optical films. Improved Reactive Atmosphere Processing, (RAP), techniques were developed and studied using a two zone RAP furnace for single crystal growth of BaF2 and CaF2 which resulted in improved infrared transmission in the 3 to 5 micron wavelength region for the first time.

AD-A094 782/0 PC **A09**/MF **A01**
Hawaii Univ., Honolulu. Dept. of Physics and Astronomy.
A Study of the Acoustic-Optic Effect in Nematics.
Final rept. 1 Sep 78-31 Dec 80,
Charles F. Hayes. 31 Dec 80, 193p Rept no. 004
Contract N00014-78-C-0417

The program of this contract has been to study the acousto-optic effect which occurs in nematic liquid crystals when excited by acoustic waves. Both theory and practical application are presented. Hydrodynamic equations were solved which govern the streaming and obtained a solution for the magnitude of the fluid speed and flow pattern for a small disc-shaped liquid crystal. A sample, doped with grains, was used to test the solution experimentally. A series of cells were constructed and tested which, in fact, showed that an acoustic wavefront pattern can be visualized with this technique. During the second year of the contract we developed and tested a mathematical model which prescribes how a cell should be constructed in terms of: the densities of the cell walls, liquid

crystal, and surrounding fluids; the thickness of the cell walls and liquid crystal layer; the acoustic speeds in cell wall (shear and longitudinal), liquid crystal, and surrounding fluids; acoustic frequency; and the incident acoustic bean angle. Cells were also constructed and tested in which an electric field could be applied simultaneously with the acoustic wave in such a way that the sensitivity of the cell to the acoustic field could be adjusted.

AD-A094 787/9 PC **A04**/MF **A01**
Avco-Everett Research Lab., Inc., Everett, MA.
Analysis of Ultraviolet and Visible Laser Effects.
Final technical rept. 20 Aug-15 Nov 80,
C. Duzy, C. J. Knight, J. A. Woodroffe, and L. A. Young. Jan 81, 72p
Contract DAAH01-80-C-1523, DARPA Order-3643

In extrapolating UV/visible effects data obtained with small spots to large spots, it is essential to determine the dominant mechanisms. In this report we present analytical results on the dominant effects at high fluence, vaporization of the surface and plasma formation. Under vacuum conditions with an aluminum surface and about microsecond pulses, we find the impulse coupling coefficient due to vapor recoil to be about 3 for XeF and about 6 for KrF at high fluences. The plasma threshold is >25 MW sq cm incident flux and <100 sq cm; the exact value depends on assumptions regarding rate constants. (Author)

AD-A094 803/4 PC **A05**/MF **A01**
Washington State Univ., Pullman. Dept. of Physics.
Interaction of Intense Infrared Laser Beams with Transparent Solids.
Final rept. 1 Aug 78-30 Sep 80,
P. Braunlich, Garnett Bryant, A. Schmid, and P. Kelly. 1 Dec 80, 77p AFOSR-TR-81-0030
Contract F49620-78-C-0095

In order to investigate beam deformation and depletion at very high photon fluxes, a computational procedure has been developed that is suitable to simulate the propagation of intense beams through transparent solids. It was applied to NaCl exposed to a FWHM 21 psec pulse from a frequency-doubled 0.532 micron Nd-YAG laser. The energy content of this TEM sub-(zero-zero)-mode pulse is equal to the experimentally determined single-shot damage threshold of this material. The most convenient mode of data display was found to be a motion picture showing the propagation of the pulse, represented as a colored contour map of the local photon flux, through the focal region. Similar displays of the spatio-temporal development of the free carrier concentration have been made. The material-laser photon interactions in these calculations were based on the two main laser damage mechanisms: avalanche ionization and multiphoton-polaron absorption. The most significant result of these investigations is that, according to both models, beam deformation prevents the build-up of a sufficient photon flux in the interaction area to cause damage at this pulse energy. This means that either both damage mechanisms do not explain the best experimentally available data or these data are extrinsic rather than intrinsic features of the material.

AD-A095 079/0 PC **A03**/MF **A01**
Defence Research Establishment Valcartier (Quebec).
Focused Laser Beams in Turbulent Media.
L. R. Bissonnette. Dec 80, 49p Rept no. DREV-R-4178/80
Abstract in French.

A closed set of three simultaneous partial differential equations is derived for the solution of the average irradiance and the irradiance variance of focused laser beams in a turbulent medium. The equations are uniformly valid for arbitrary scintillation levels. Examples of solutions calculated by finite difference techniques agree very well with experimental data in the atmosphere and in the laboratory. An analytic expression for the turbulence-induced beam spreading is obtained and shown to be more precise than the commonly used formula based on the coherence diameter rho sub 0. In the weak scintillation limit, the irradiance variance solution agrees with the classical perturbation results. (Author)

AD-A095 098/0 PC **A03**/MF **A01**
Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.
Imaging through Scattering Media with Grating-Based Interferometers.
Final rept. 1 Aug 79-31 Oct 80,
Anthony M. Tai, and Carl C. Aleksoff. Dec 80, 27p ERIM-143900-8-F, ARO-16226.5-EL
Contract DAAG29-79-C-0143

In this report, the problem of imaging through scattering media is described and the basic approaches to the problem are reviewed. The concept of grating-based interferometers is introduced and some possible configurations are presented. The applications of the grating interferometers in imaging through scattering media are analyzed. The interferometers are basically utilized as coherence discriminators, separating out the scattered components of the received light fields by their coherence properties. The imaging of targets under both monochromatic and wideband illuminations are considered. Experimental results are provided to demonstrate the effectiveness of the concept. (Author)

AD-A095 100/4 PC **A03**/MF **A01**
Arizona Univ., Tucson. Optical Sciences Center.
Spectral Analysis Studies.
Final rept.,
William L. Wolfe. Jul 79, 32p SD-TR-80-73
Contract F04701-77-C-0059

Several approaches to spectral analysis have been analyzed theoretically. These include prism and grating spectrometers, interferometers, multislit dispersive systems, and Fresnel zone plate spectrometers. The technique of tunable acousto-optic filtering was investigated experimentally. (Author)

AD-A095 132/7 PC **A08**/MF **A01**
Arizona Univ., Tucson. Optical Sciences Center.
Light-Scattering Characteristics of Optical Surfaces.
Final rept.,
J. E. Harvey, and R. V. Shack. 1975, 163p SD-TR-80-70
Contract F04701-75-C-0106

An investigation of the relationship between surface microstructure and radiant energy scattering has been conducted. Light scattering from optical surfaces is treated as a diffraction process in which the pupil function has random phase variations in addition to any existing amplitude variations. A new theory of surface scatter phenomena has been formulated by utilizing the same Fourier techniques that have proven so successful in the area of image formation. An analytical expression has been obtained for a surface transfer function which relates the surface micro-roughness to the scattered distribution of radiation from that surface. The existence of such a transfer function implies a shift-invariant scattering function which does not change shape with the angle of the incident beam. This result greatly reduces the quantity of data required to completely characterize the scattering properties of a surface. For a large class of well-behaved surfaces this transfer function is described in terms of only the rms surface roughness and the surface autocovariance function. It thus provides a straightforward solution to the inverse scattering problem (i.e., determining surface characteristics from scattered light measurements). Once the surface charcteristics are known, the same theory provides an equally simple method of predicting the wavelength dependence of the scattered light distribution. An extensive experimental program has accompanied this theoretical development.

PB81-139891
(Order as PB81-139859, PC **A05**/MF **A01**)
Academia Sinica, Shanghai (China). Shanghai Inst. of Optics and Fine Mechanics.
Backward-Wave Parametric Oscillation by Degenerate Four-Wave Mixing.
Wu Cunkai, Fan Junyin, Wang Zhiying, Fan Qikang, and Mao Weimin. 24 Jul 79, 4p
Included in Scientia Sinica, v25 n12 p988-991 Dec 80.

This paper reports on parametric oscillation by degenerate four-wave mixing, i.e., backward-wave parametric oscillation generated by spontaneous emission in the absence of incident object wave, using nitrobenzene as the nonlinear medium under on-line and off-line pumping.

PB81-858979 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Birefringence in Crystals. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 63p NERACSPNNT3093

This retrospective bibliography contains citations concerning the birefringent properties and behavior of a variety of crystals. Interpretation of the optical properties and polarization-induced effects and the optical activity and absorption in birefringent crystals are included, as are some applications for them. (Contains 68 citations, fully indexed and including a table of contents.)

20G. Particle Accelerators

CONF-8010111-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Status of the Oak Ridge 25 MV Tandem Accelerator.
N. F. Ziegler, E. G. Richardson, J. E. Mann, R. C. Juras, and C. M. Jones. 1980, 10p
Contract W-7405-ENG-26
Symposium of Northeastern Accelerator personnel, Madison, WI, USA, 13 Oct 1980.

A summary is given of the performance testing of the 25 URC Pelletron tandem at Oak Ridge National Laboratory during the period from October 1979 through October 1980. (ERA citation 06:008085)

COO-2114-45 PC **A02**/MF **A01**
Colorado Univ. at Boulder. Dept. of Physics and Astrophysics.
Elementary Particles and High Energy Phenomena. Progress Report.
W. T. Ford. Jan 81, 21p
Contract AC02-76ER02114

During the year 1980 our major effort was to bring two detectors into an operational status: The Fermilab Tagged Photon Spectrometer has now gone through one shake-down run and most elements of the detector are operational. Data were obtained on both Cerenkov counters and it shows that the Cerenkov counters are working adequately. Similar results were obtained for the recoil chamber, the drift chambers and the SLIC. Work still is going on for the outriggers and the hadrometer. The MAC central drift chamber is now operational and has good resolution. The rest of the detector is also up with the exception of the outer muon counters. Work in theory continues along the lines of various photoproduction processes, and the study of grand unified gauge theories. (ERA citation 06:006423)

DL/SCI/TM-23A PC **A02**/MF **A01**
Science Research Council, Daresbury (England). Daresbury Lab.
Survey of Possible Lattice Modifications for the SRS.
V. P. Suller. May 80, 14p
U.S. Sales Only.

This paper considers the improvements to the high energy synchrotron radiation source (SRS) performance which would result from a series of different modifications that have the common feature of leaving unchanged the ring of dipole magnets. The modifications will be made to the number and location of the quadrupole magnets which lie in the straight sections. It is shown that substantial reductions in horizontal beam emittance can be achieved by modifying the lattice to an achromatic arc type or by doubling the number of unit cells, the latter approach being preferred since it results in a much better behaved lattice. The reduction in momentum compaction factor which also takes place would mean that the maximum energy could be increased to 2.5 GeV without needing more r.f. power. (Atomindex citation 11:549208)

EFI-340(65)-78 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Liquid Deuterium Target.
K. Sh. Agababyan, and R. T. Mina. 1979, 11p
In Russian.
U.S. Sales Only.

The construction of liqued deuterium target in which the deuterium liquefaction takes place due to heat exchange with warming helium vapor is presented. The value of liquifaction factor of deuterium is measured. The measured value is in a good agreement with the calculated one, and makes 3.8 l of liquid helium per 1 l of liquid deuterium. (Atomindex citation 11:549106)

HEDL-SA-2256 PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
FMIT Update.
J. J. Holmes. 26 Sep 80, 19p CONF-8010140-1
Contract AC14-76FF02170
MOE/DOE seminar, Mito, Japan, 27 Oct 1980.

This document comprises viewographs which describes the Fusion Materials Irradiation Test Facility (FMIT) and gives its schedule of completion. FMIT will approximate the neutron environment in fusion plants by means of deuterium ions accelerated to 35 MeV onto a liquid lithium target. (ERA citation 06:008086)

IFVE-OUNK-79-53 PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Waveguide and Resonator Accelerating Systems for Accelerating Storage Complex.
G. G. Gurov, V. V. Katalev, and S. A. Kuznetsov. 1979, 40p
In Russian.
U.S. Sales Only.

Two types of HF accelerating systems, are considered viz. Waveguide and resonator ones with HF supply through a T-bridge to provide a regime of nominal current acceleration in a slow and fast cycles in an accelerating storage complex. Optimization methods of unit parameters have been developed, transition processes in them being studied. Technological spaces between accelerating waveguides were 1.5 m, the length of accelerating resonator was 3 m. Both waveguide accelerating system and resonator one with a bridge supply permit one to place HF-generators in the attended room and do not demand a reconstruction during accelerating cycle. Both systems have an approximately equal number of accelerating stations of an equal power. (Atomindex citation 11:549177)

INIS-mf-5740 PC **A09**/MF **A01**
Laval Univ., Quebec. Lab. de l'Accelerateur van de Graaff.
Rapport Annuel, 1978.
Nov 78, 199p
U.S. Sales Only.

Operation of the accelerator between Nov. 1, 1977 and Nov. 1, 1978 is described. Research in progress includes work on nuclear reactions and polarization phenomena, nuclear reactions with heavy ions, theoretical and experimental study of aspects of multi-body problems in nuclear reactions, development of a gamma spectrometer, study of nuclear structure by isobaric analog resonances, application of nuclear techniques to geology and botany, and study of atomic structure. (Atomindex citation 11:531900)

ITEF-51(1979) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Theory of Quasistochastic Processes in Ring BEAMS of Charged Particles.
P. R. Zenkevich. 1979, 24p
In Russian.
U.S. Sales Only.

The quasistochastic process of transverse temperature alterations in charged particle nongrouped ring beams is investigated. The formulae are drawn which determine temperature alteration rate in single- beam and double-beam systems. Isochastic beam cooling with the system of negative feedback over the derivative suggested by Van der Meer is viewed as a possible application of the theory. Electromagnetic forces which appear in the course of particle interaction with the media are shown to influence beam transverse temperature in two ways. They change the beam heating rate with outside noise and bring about additional heating (or cooling). Taking into account this effect leads to the decrease in magnetic field permissible deviations from the nominal value in the electron-ring accelerator. (Atomindex citation 11:549216)

ITEF-59(1979) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Modernization of Standard Magnets and Their Application in the Secondary Particle Channels of the ITEP Proton Synchrotron.
L. N. Kondrat'ev, L. L. Gol'din, M. M. Kats, N. N. Luzhetskii, and R. N. Rykova. 1979, 16p
In Russian.
U.S. Sales Only.

Described are the results of magnetic measurements of standard and modified magnets of the SP12 and SP94 types which are used while constructing the channel system of secondary particle beams of the ITEHF proton synchrotron. The schemes of gaps and main parameters of the SP12 and SP94 magnets, as well as the schemes of their modifications are presented. The distribution of the field in cross sections of the SP12 standard magnet and its modifications at various gaps are shown. The magnetization curves and the effective lengths of the SP12 and SP94 type magnets are given. (Atomindex citation 11:549185)

JINR-R-9-12441 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR).
Root-Mean-Square Dimensions of Electron-Ion Rings.
N. Yu. Kazarinov, and E. A. Perel'shtein. 1979, 18p
In Russian.
U.S. Sales Only.

On the basis of the distribution function momentum method equations are derived, describing the change in time of coordinates of mass local centers and of root-mean-square dimensions of an accelerated electron-ion ring. The adiabatic invariants generalizing the usual invariants of betatron oscillations are found in case of two-component ring with non-coinciding dimensions of electron and ion ring cross sections. The steady states of accelerated electron-ion rings are studied. Proceeding from the stability of steady states the maximum possible ion energy gain on the unit accelerator length is found, taking into account the change of ring sizes at acceleration. It is shown that the application of external focusing results in additional energy gain in comparison with the acceleration of self-focusing ring. (Atomindex citation 11:549183)

JINR-R-9-12442 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods.
Equipment for Pulsed Magnetic Field Gradients Measurement in a Combined Accelerating System of the Heavy Ion Collective Accelerator Prototype.
V. M. Lachinov, V. K. Makoveev, and N. V. Klokov. 1979, 14p
In Russian.
U.S. Sales Only.

A discussion is given of the magnetometric equipment developed for measuring pulsed magnetic fields in combined accelerating system of the heavy ion collective accelerator prototype (HICA) comprising two solenoids with the decreasing field and induction accelerating system. The general system length constitutes 3.5 m. Made is the gradient measuring channel is made on the basis of two common channels of MIKh-2M type magnetometer. The measuring accuracy of field gradients is increased by an order of magnitude in comparison with one-channel method. A permission on the approximately 10 exp -4 T/cm gradient in fields up to 2T is achieved. A flowsheet and parameters of the device for automized drive of the magnetometer tester at measurements in accelerator are presented. The measurements carried out have shown a high efficiency of gradient measuring channel, its good noiseproofness and operation stability, which achieves roughly about 10 exp -4 . (Atomindex citation 11:549187)

JINR-R-9-12614 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
Radiation of a Current Ring Bunch Moving Along the Axis of a Semi-Infinite Coaxial System.
A. Sh. Irkegulov, E. I. Urazakov, and A. B. Shvachka. 1979, 15p
In Russian.
U.S. Sales Only.

The excitation of the semi-infinite coaxial system by ring bunch with azimuthal current moving along the axis of the accelerating channel was studied. The boundary value problem comes to the system of two coupled integral equations of the Wiener-Hopf-Fock type. This system was solved by factorization of the matrix kern of the system of integral equations. The kern was decomposed over the projective matrices and the solution of the system of equations was determined by factorization of the eigenvalues of this expansion. The projective matrices were obtained by using the Pauli matrices. The analytic expressions for the radiation field, energy flux density and the radiative force, acting on the ring bunch were found. The numerical simulation via computer for the special configuration of the channel was performed. The energy flux and radiative force depending on the speed of bunch along the axis of system were determined. (Atomindex citation 11:531888)

JINR-R-9-12660 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods.
Choice of Parameters of the Injection System with a Rapidly Varying Magnetic Field in the Adgezator of a Collective Accelerator.
V. M. Zhabitskii, and I. N. Ivanov. 1979, 16p
In Russian.
U.S. Sales Only.

The problem of choice of parameters of injection system with rapidly-varying magnetic field in an adgezator of the collective accelerator is considered. In such system magnetic field is created with coils along which constant current I and pulsed current J flow. Because of a fast change of the current J the removal of electrons from the inflector occurs and the electron ring is formed. A method for representing in the same figure of all possible trajectories of equilibrium orbits of injected particles during the ring formation is described. Formulas for calculating values of the I and J optimum current in the moment of injection are presented. In this regime speed of the electron removal from the inflector reaches a maximum value on the injection equilibrium radius. This method of choosing parameters of injection system with rapidly-varying magnetic field is used for calculating such a system for adgezator for the model of the JINR collective accelerator. The results of this calculation are presented. (Atomindex citation 11:531931)

JINR-R-9-12739 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods.
Analog Method for Measurement of Longitudinal Coupling Impedance of an Electron Ring in a Chamber Containing Resonant Elements.
Yu. I. Aleksakhin, I. Gabanets, and Z. G. Gavrilova. 1979, 18p
In Russian.
U.S. Sales Only.

An analog method for measurement of the longitudinal coupling impedance of charged particle beam with the accelerator chamber is considered. The method is generalized for systems containing azimuthally inhomogeneous and resonant elements. Scheme and measurement results for electron ring coupling impedance with the injector in the compressor chamber are given. These results testify that resonant coupling with the injector (acting as a quarter-wave vibrator) may affect the electron ring significantly during its formation and at first stage of compression. (Atomindex citation 11:531842)

JINR-11-12682 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Software of the System for Tuning and Control of Particle Transport Channels.
Ya. M. Damatov, R. I. Kukushkina, R. S. Radzhabov, A. D. Rogal, and T. F. Sapozhnikova. 1979, 13p
In Russian.
U.S. Sales Only.

The program guarantee for beam tuning system is examined. The program guarantee gives a possibility to receive beam profiles in horizontal and vertical planes, the bivariate particle distribution in beam cross section, the angular beam distribution and particle distribution in phase area. Besides, there are programs which allow one to determine place of beam cross-over with calculating particle coordinates and cobstruction of beam cross section. The program system volume is eight "K" words. The program is written in "ASSEMBLER" language for ES-1010 computer. (Atomindex citation 11:549678)

JINR-9-12723 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Dubna Synchrophasotron. Operation and Improvement (Quarter 1, 1979).
Yu. D. Beznogikh, M. A. Voevodin, and A. I. Govorov. 1979, 18p
In Russian.
U.S. Sales Only.

Data on the accelerator operation in the first quarter of 1979 are presented in brief. A list of physical experiments conducted with synchrophasotron beams is given. The results of B-timer calibration are reported the accuracy of magnetic field adjustment is 3-4%. A model variant of the system intended for the improvement of the extracted beam structure and for that of some output performances. is described. It is stated as a result of the studies that an effective suppression of low-frequency modulation components of extracted beam currents (up to 150 Hz inclusive) is possible using a feedback system (FS). Requirements for FS current parameters are determined and formulated, the test equipment being built according to them. Based on the operation of the experimental equipment, the main parameters are determined, using which a working version has been developed. The main parameters of the improved HF system are considered along with those of beam buncher of the LU-20 linear accelerator used as an injector in the JINR synchrophasotron. A sheam of the division of the LU-20 resonator into two resonance sections is given. The intensity of deutron and alpha -particle beams at the outlet of the LU-20 is noted to grow threefold and fivefold, respectively, as compared with acceleration regime without the LU-20 resonator modification with a lowered voltage of a foreinjector (approximately 300 kV). Measurement results of the height position of the accelerator electromagnet are presented along with calculation data of the position of electromagnet sectors in space. (Atomindex citation 11:549162)

LA-8388 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Space-Charge Limits in Linear Accelerators.
T. P. Wangler. Dec 80, 28p
Contract W-7405-ENG-36

This report presents equations that allow an approximate evaluation of the limiting beam current for a large class of radio-frequency linear accelerators, which use quadrupole strong focusing. Included are the Alvarez, the Wideroe, and the radio-frequency quadrupole linacs. The limiting-current formulas are presented for both the longitudinal and the transverse degrees of freedom by assuming that the average space-charge force in the beam bunch arises from a uniformly distributed charge within an azimuthally symmetric three-dimensional ellipsoid. The Mathieu equation is obtained as an approximate, but general, form for the transverse equation of motion. The smooth-approximation method is used to obtain a solution and an expression for the transverse current limit. The form of the current-limit formulas for different linac constraints is discussed. (ERA citation 06:006420)

LA-8600-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Edge Envelope Equation for a Ballistically Focused Neutralized Ion Beam.
D. S. Lemons, and L. E. Thode. Nov 80, 10p
Contract W-7405-ENG-36

An envelope equation for a cold ion beam with overall charge and current neutralization provided by a coflowing electron gas obeying an adiabatic equation of state is derived. The derivation assumes the beam evolves self-similarly with the ion at the edge of a uniform density ion profile. Numerical and approximate analytical solutions are calculated. (ERA citation 06:006421)

LBL-11685 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Considerations for Design Parameters for a Dedicated Medical Accelerator.
J. R. Alonso. Oct 80, 27p CONF-8010145-1
Contract W-7405-ENG-48
MARIA workshop II on optimal parameters of relativistic heavy ions for radio-therapy research, Edmonton, Alberta, Canada, 9 Oct 1980.

There are only a very few critical parameters which determine the size, performance and cost of a heavy ion accelerator. These are the mass of the heaviest ion desired, the maximum range of this heaviest ion in tissue, and the highest intensity desired. Other parameters, such as beam emittance, beam delivery flexibility, reliability and experimental facility configurations are important, but are not primary driving factors in the design effort. The various clinical applications for a heavy ion accelerator are evaluated, detailing the most desirable beams for each application. (ERA citation 06:008088)

NIIEFA-P-K-0417 PC **A03**/MF **A01**
Nauchno-Issledovatel'skii Inst. Elektrofizicheskoi Apparatury, Leningrad (USSR).
Dynamics of Ion BEAMS in Direct Action Acceierators.
M. I. Avramenko, V. I. Bogdanova, V. S. Kuznetsov, R. P. Fidel'skaya, and A. N. Fomichev. 1979, 35p
In Russian.
U.S. Sales Only.

The general performance is described of an ion-optical system of the direct current accelerator (DCA), usually including an ion source with a preliminary beam shaping system an accelerating tube and ion channel with the corresponding devices for focusing. Calculation techniques for extended ion beams in drift region (ion channel region) as well as in an external axial-symmetric electrostatic field (the region of preliminary beam formation and acceleration region) are presented. Methods for calculation of ion-optical systems of DCA are considered. Calculation methods are systematized depending on phase, current and energy performances of ion beams. Numerical solution for ion beam parameters of a certain accelerator is given as an example. (Atomindex citation 11:549156)

NIIEFA-P-V-0406 PC **A02**/MF **A01**
Nauchno-Issledovatel'skii Inst. Elektrofizicheskoi Apparatury, Leningrad (USSR).
Transient Process in a Chain of Coupled Cavity Resonators.
A. K. Orlov. 1979, 19p
In Russian.
U.S. Sales Only.

Transient processes in a chain of coupled resonators in the case of switching a HF-generator and a beam are investigated using the method of eigenfunction. Optimum time for the beam retention relative too the moment of generator switching is found in the case of superconducting (SC) section. The concept of electron quality factor is analyzed. It is shown that the pi /2 oscillation type is characterized by the process of field formation, analogous to the process in a long line. Numerical row summation is to be carried out to analyze the characteristics of the pi -structure. Establishment time in a SC section is determined with a basic harmony. (Atomindex citation 11:549197)

ORNL-tr-4703 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Cryogenic Electron Beam Ionizer KRION-2.
E. D. Donets, and V. P. Ovsyannikov. 12p
Contract W-7405-ENG-26
C Preprint of the Joint Institute for Nuclear Research, Dubna, USSR, 1980.

At the high energy laboratory at JINR an electron-beam ionization method is being developed for the production of beams of multicharged ions. It is based on the cryogenic electron beam ionizer KRION, with which beams of nuclei of carbon and nitrogen, and later, oxygen and neon are obtained, completely electron-free. This ionizer is now used as a source of C, N, O, and Ne nuclei for their acceleration in a synchrophasotron at the high energy laboratory at JINR. The KRION-2 was created for further development of the electron beam method of ionization as well as for studying ionization processes of positive ions by electron impact. The KRION-2 is described along with the method of injecting ions into the electron beam. (ERA citation 06:008084)

20H. Particle Physics

BNL-NCS-51250 PC **A07**/MF **A01**
Brookhaven National Lab., Upton, NY.
Minutes of the Fourth Annual Meeting of the Panel on Reference Nuclear Data, Brookhaven National Laboratory, November 1-2, 1979.
T. W. Burrows, L. Stewart, and J. J. Coyne. Jun 80, 148p
Contract AC02-76CH00016

After the welcome and approval of the agenda and of the minutes of the Third Annual Meeting, the participants turned to reactor physics data needs, CTR data needs, status of international and national cooperation, status and availability of data files, election of officers, status of publications, biomedical data needs, and miscellaneous action items from the Third Meeting. A summary of recommendations and action items is given. Eighteen appendixes are included. (ERA citation 06:006722)

BNL-28629 PC **A02**/MF **A01**
Fudan Univ., Shanghai (China). Dept. of Mathematics.
Comments on the Integrability of the Loop-Space Chiral Equations.
C. Gu, and L. L. C. Wang. 1980, 10p CONF-800724-61
Contract AC02-76CH00016
20. international conference on high energy physics, Madison, WI, USA, 17 Jul 1980.

A demonstration is given how the ordinary space chiral equations provide the existence conditions for the infinite number of conserved currents and how these currents are related to the so-called inverse-scattering equations, whose integrability is provided by the original chiral equations. Loop-space chiral equations are introduced. The integrability conditions of the non-local currents in two possible different situations are discussed. In the first case, the generating functions are functionals of the loop alone. The integrability conditions are not satisfied and higher order conserved non-local currents do not exist. In the second case, the generating functions are functionals of the loop as well as a parameter the integrability conditions at a restricted point of the parameter are satisfied, however there is an infinite fold of arbitrariness. It indicates that additional guiding principles are needed in addition to the original loop-space chiral equation in order to uniquely determine the infinite conserved non-local currents as functionals of the loop and the parameter. (ERA citation 06:006720)

CEA-CONF-4791 PC **A02**/MF **A01**
CEA Centre d'Etudes de Bruyeres-le-Chatel, Montrouge (France).
Shape Transition and Quadrupole Softness in the Germanium Isotopes.
M. Girod, and B. Grammaticos. 1979, 1p
U.S. Sales Only.

No abstract available.

CEA-CONF-5008 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Service de Physique Nucleaire a Moyenne Energie.
Sigma - Hypernuclei.
B. Mayer. 1979, 15p CONF-7909118-4
International conference on hypernuclear and low energy kaon physics, Jablonna, Poland, 11 Sep 1979.
U.S. Sales Only.

sigma hypernuclei are produced by the elementary reactions K exp - +n implies sigma exp 0 + pi exp - ; K exp - +p implies sigma exp + + pi exp - ; K exp - +p implies sigma exp - + pi exp + , which cross-sections are not negligible compared to that for lambda production. The sigma however are about 80 MeV heavier than the lambda and they can undergo the sigma N implies lambda N strong conversion in the nucleus. The question therefore arises how the sigma behaves in the nuclear field, if sigma -hypernuclear states can be formed with a structure similar to lambda -hypernuclei, and what will be their width. For the last twenty years only few-body systems including a sigma have been considered, mostly dibaryons. We review here the search for such bound systems and then report recent experiments at CERN that bring substantial evidence for the existence of light sigma -hypernuclei. (Atomindex citation 11:546275)

CEA-CONF-5038 PC **A02**/MF **A01**
CEA Centre d'Etudes de Bruyeres-le-Chatel, Montrouge (France).
Neutron Capture Cross Sections of Rubidium, Yttrium, Niobium, Cesium, Cerium and Gadolinium Between 0.5 and 3.0 MeV.
J. Voignier, S. Joly, and G. Grenier. 1979, 5p CONF-791223-9
NEANDC specialist meeting on neutron cross sections of fission product nuclei, Bologna, Italy, 12 Dec 1979.
U.S. Sales Only.

Neutron capture cross sections have been measured for the nuclides Rb, Y, Nb, Cs, Ce, Gd and for the isotopes exp 155 Gd, exp 156 Gd, exp 157 Gd, exp 158 Gd and exp 160 Gd in the 0.5 MeV to 3.0 MeV neutron energy range. Absolute capture cross sections are determined by combining the technique used to study gamma-ray strength functions and the spectrum method of measuring partial neutron capture cross sections. The gamma rays are detected by a NaI scintillator surrounded by an annular NaI detector. Time-of-flight techniques are used to improve the signal-to-background ratio. Present results are compared with ENDF evaluations and with recent results obtained from statistical model calculations. (Atomindex citation 11:546305)

CEA-CONF-5051 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Cadarache, Saint-Paul-les-Durance (France). Dept. des Reacteurs a Neutrons Rapides.
Evaluation of the exp 237 Np Neutron Cross Sections in the Energy Range from 10 exp -5 EV to 5 MeV.
H. Derrien, and E. Fort. 1979, 6p CONF-791058-82
International conference on nuclear cross sections for technology, Knoxville, TN, USA, 22 Oct 1979.
U.S. Sales Only.

The exp 237 Np neutron cross-sections have been evaluated in the energy range from thermal to 5 MeV. A set of resonance parameters including a negative level is recommended after examination of the available experimental data. This set is used 1) to calculate the cross-sections from the thermal region to 150 eV, and 2) to provide the statistical parameters suitable to the calculations in the unresolved region. At higher energies, the transmission coefficients Te are calculated by the coupled channel optical model code ECIS. They are then used as input in the statistical model code FISINGA. The optical model parameters, including the deformation parameters, are those used by Lagrange for the Pu isotopes, slightly modified to reproduce at 40 keV the total cross-sections obtained from the pure statistical parameters. The recommendations of Lynn concerning the level density parameters have been used. In this paper we describe the various steps of the evaluation. (Atomindex citation 11:546230)

CEA-CONF-5052 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Cadarache, Saint-Paul-les-Durance (France). Dept. des Reacteurs a Neutrons Rapides.
Complete Evaluation of exp 241 Am Between Thermal Energy and 15 MeV - Nuclear Models Used Consistency with Integral Data.
E. Fort, M. Darrouzet, H. Derrien, P. Hammer, and L. Martin-Deidier. 1979, 10p CONF-791058-83
International conference on nuclear cross sections for technology, Knoxville, TN, USA, 22 Oct 1979.
U.S. Sales Only.

In this evaluation both integral and microscopic data are considered as reference data. Calculations are performed with SLBW formalism in the resolved resonance region and statistical formalism elsewhere. Neutron penetrabilities are obtained from coupled channel calculations, considering exp 241 Am as a symmetric rotational nucleus. For fission the agreement is excellent between evaluated and integral data and is confirmed by the most recent microscopic measurements. High values for capture cross-sections are supported by integral measurements. (Atomindex citation 11:546241)

COO-0535-768 PC **A11**/MF **A01**
Colorado Univ., Boulder. Nuclear Physics Lab.
Technical Progress Report, November 1, 1979-October 31, 1980. Report NPL-865.
1 Nov 80, 242p
Contract AC02-76ER00535

Work carried out at the Nuclear Physics Laboratory of the University of Colorado from November 1, 1979 through October 31, 1980 is summarized. Emphasis was on light ion reaction studies with the AVF cyclotron. The high resolution magnetic spectrometer has allowed studies of nucleon transfer, scattering, and charge exchange reactions throughout the periodic table. More experiments have been run with solid state counters this year than has been the case recently, as a broad range spectra of the light nuclei where only moderate resolution is demanded were examined. Several of these experiments were undertaken for more detailed studies of excitations seen with higher energy probes. Multiple coincidence measurements with neutron and gamma-ray counters have opened a new program in pre-equilibrium reactions and provided a new signature for the study of neutron-deficient final nuclei. The neutron time of flight program has expanded to higher excitation and to use of the (d,n) and (alpha ,n) direct nucleon transfer reactions. Three important experiments were completed at the EPICS pion scattering facility at LAMPF, and other low energy pion scattering data were obtained at TRIUMF. Several (p,d) runs at high energies were accomplished, some with polarized beams at TRIUMF. High-lying structures in medium mass nuclei were studied by the (p,n) reaction at Indiana. Interest in the use of polarized beams has been prompted by the theoretical successes in this area. This interest has led to the study of one- and two-nucleon transfer reactions on a range of nuclei at the Los Alamos tandem and at IUCF. (ERA citation 06:006723)

EFI-375(33)-79 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
X-Ray Interferometry for Synchrotron Radiation.
G. M. Avetisyan, P. A. Bezirganyan, A. G. Grigoryan, S. A. Mnatsakanyan, and M. L. Petrosyan. 1979, 13p
In Russian.
U.S. Sales Only.

The X-ray interference phenomena, i.e. pendulum bands of a spherical wave from a wedge-shaped silicon crystal and moire patterns from the interferometer of L-L-L type, are investigated on synchrotron radiation of the Yerevan ring accelerator. It is shown that the synchrotron radiation can be successfully used to investigate X-ray dynamic scattering in crystals. An assumption has been made on the nature of occurrence of pendulum bands of a spherical wave. It is also shown that for the given spectral distribution the interference moire patterns are detected in 0.6 - 1 A wavelength range. (Atomindex citation 11:549377)

INIS-mf-5750 PC **A04**/MF **A01**
Utrecht Rijksuniversiteit (Netherlands).

Radiative Corrections to E exp + E exp - Implies W exp + W exp - in the Weinberg Model.
M. E. Lemoine. 1979, 75p
Thesis.
U.S. Sales Only.

The author summarizes the Weinberg model and then gives the lowest-order cross section for e exp + e exp - implies W exp + W exp - . The various radiative corrections are then dealt with, and the method used to compute them is outlined. Bremsstrahlung and infrared divergences are discussed together with the renormalization procedure. The Ward identities are then summarized. The leading terms of the amplitude in the limit of large Higgs mass are discussed and the results, presented. (Atomindex citation 11:530066)

INIS-mf-5811 PC **A05**/MF **A01**
Instituut voor Kernphysisch Onderzoek, Amsterdam (Netherlands).
IKO Annual Report 1979.
1980, 91p
U.S. Sales Only.

A review of the work performed at IKO over the past year is presented. In particular, electron scattering, muon and hadron physics, nuclear theory, radio- and nuclear chemistry, and the MEA linac are discussed. (Atomindex citation 11:553204)

ITF-79-61R PC **A02**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Some Properties of Rotational Spectrum of a exp 8 Be Nucleus.
A. I. Steshenko. 1979, 23p
In Russian.
U.S. Sales Only.

The spectrum of Be exp 8 rotational excitations is considered from the viewpoint of different modern calculation methods of the structure of light nuclei. The problem about the correlation of contributions, conditioned by the kinetic and potential energy operators, into the total rotational energy of I exp + states is studied in detail. This correlation is shown to change strongly under the transition from one model to another. For the case of N-N forces with the repulsive core the rotational spectrum inversion under nuclear compression occurs. (Atomindex citation 11:530436)

ITP-78-167E PC **A02**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Hadron Jet Features in Two-Fireball Model of E exp + E exp - -Annihilation.
S. M. Eliseev, M. I. Gorenstein, V. K. Petrov, and G. M. Zinoviev. 1979, 13p
U.S. Sales Only.

Hadron jet features in e exp + e exp - annihilation (sphericity, P/sub T/ distribution, etc.) are calculated by Monte-Carlo method using two moving fireball model. Quantitative agreement with experimental data is obtained. (Atomindex citation 11:530028)

ITP-79-15E PC **A02**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Scale Relations Between Meson and Baryon Trajectories.
N. A. Kobylinsky, E. S. Martynov, and A. B. Prognimak. 1979, 25p
U.S. Sales Only.

Conditions for the dual analytic model of pi N-scattering to have correct signature and isospin structure are studied. Scale relations between mesonic and baryonic trajectories are derived. An analysis of the N-, lambda - and sigma -trajectory data is carried out; contributions of the low-energy thresholds and left-hand cut are extracted and leading contributions are recovered. Estimations for the scale coefficients that relate mesonic trajectories with baryonic ones are obtained. (Atomindex citation 11:530062)

ITP-79-35E PC **A02**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
New Approach to Mass Formulas.
N. A. Kobylinsky, A. I. Kosenko, and R. S. Tutik. 1979, 13p

U.S. Sales Only.

The Regge approach to mass formulas is grounded. The main types of interrelations between meson masses are picked out and analyzed. The spectrum of vector mesons with the fifth flavor is also evaluated. (Atomindex citation 11:530061)

ITP-79-36E PC **A02**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Interrelations Between Baryon Trajectories and New Mass Formulas for Baryon Octet.
N. A. Kobylinsky, A. I. Kosenko, and R. S. Tutik. 1979, 15p
U.S. Sales Only.

In the framework of the dual analytic model the interrelations between Regge slopes and intercepts for baryon octet are obtained. The relations agree well with experiment and lead to new mass formulas for octets 1/2 exp + , 1/2 exp - and their angular excitations. (Atomindex citation 11:530060)

JINR-R-1-12504 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Observation of the Interference Effect of Identical Pions and Determination of the Size of Their Production Region in the exp 12 C- exp 181 Ta Collisions at 4.2 GeV/C.Nucleon.
N. Angelov, N. Akhababyan, and Ts. Baatar. 1979, 12p
In Russian.
U.S. Sales Only.

Investigated was the interference effect of secondary negative pions produced in the collision of 4.2 GeV/c. nucleon exp 12 C nuclei and exp 181 Ta nuclei in the reaction of exp 12 C+ exp 181 Ta implies K pi exp - +X; K=0,1,2.... Multiplicity distribution and negative pion momentum spectrum are presented. Timespace characteristics for the region of secondary identical particle production were studied on the base of the Kopilov and Podgoretsky method. Determined is the radius of the particle production region: r=(3.3+-0.6)fm. The value obtained is in agreement with the results got for nucleus-nucleus interactions of exp 40 Ar nuclei and Pb sub 3 O sub 4 at 1.8 GeV/nucleon energy. (Atomindex citation 11:530282)

JINR-R-13-12212 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions.
Device for Collection and Transport of Nuclear Reaction Products by Means of Laminar Gas Flow.
Yu. P. Gangrskij, and L. V. Mukhajlov. 1979, 8p
In Russian.
U.S. Sales Only.

Described is a device for collection and trasport of nuclear reaction products by means of laminar gas flow. The peculiarity of this device opetation is, that recoil nuclei knocked-out from the target are braked in the already formed gas flow and are transported to the filter by this flow. The device bases is a long tube of 1.5 cm diameter, at the end of which there is a magazine with a filter for reaction product collection. Gas flow rate can be changed by means of a outlet valve. Given are the results of the device test, obtained during the transport of products of different reactions (from exp 18 F to exp 246 Cf). It is stated, that the best collection efficiency (60%) is obtained for heavy nuclei; gas flow rate is 100 m/s while the distance from the target to the filter is 4 m. Besides, collection efficiency was not practically changed during long (up to 20 hours) measurements. The described device can be successfully used for collection and transport of recoil nuclei of short-lived isotopes to detectors, placed at the distance of several meters from the irradiated target. (Atomindex citation 11:526039)

JINR-R-2-12676 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
Hadron Charge-Exchange on Polarized Deuterons at Small Momentum Transfers.
G. I. Lykasov, and I. Strakhota. 1979, 12p
In Russian.
U.S. Sales Only.

The processes of hadron charge-exchange on polarized deuterons at small momentum transfers are investigated. Given is an expression for the cross section of hadron charge-exchange on deuterons. As meson and nucleon charge-exchange cross section behaves in different ways, the reactions of K exp + meson and proton charge-exchange on polarized deuterons are considered separately. It is shown, that in connection with the accountancy of the Pauli principle for two slow identical nucleons in the final state, the polarization characteristics differ in such processes from corresponding values in hadron charge-exchange processes on free polarized nucleons. Maximum difference in left-right asymmetry in the case of charge-exchange on nucleons may constitute = approximately 8% for 4-5 GeV/c incident K exp + mesons at the value of momentum transfer square q exp 2 =0.01(GeV/c) exp 2 , and for 0.6 GeV incident protons - = approximately 40% at q exp 2 =0.01(GeV/c) exp 2 . (Atomindex citation 11:530243)

JINR-R-6-12596 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Gamma-gamma Angular Correlations in exp 169 Yb.
M. Budzynski, G. Lizurei, Ya. Sarzhinski, M. Subbotovich, and T. Khazratov. 1979, 7p
In Russian.
U.S. Sales Only.

For the first time gamma-gamma angular correlations in exp 169 Yb have been measured for 10 cascades in exp 169 Lu implies exp 169 Yb decay. 1463.4 and 1658 keV level spins are determined as 7/2 and 5/2, respectively. Confirmed are spin values for the excited states of 275.6, 389.5, 569.8, 647.8 as 7/2, 9/2, 5/2 and 7/2, respectively. The multipole composition of gamma transition of 87.4, 291.2, 456.6, 1184.9 keV has been refined. When determining multipolarities of gamma transitions, good agreement has been got with the results obtained in measurements of internal conversion coefficients. The results of gamma-gamma angular correlation measurements in exp 169 Yb are tabulated. (Atomindex citation 11:530307)

JINR-R-7-12584 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions.
Study on the Delayed Fission of Bk, Es and Md Isotopes.
Yu. P. Gangrskii, M. B. Miller, L. V. Mikhailov, and I. F. Kharisov. 1979, 21p
In Russian.
U.S. Sales Only.

The probabilities of delayed fission on electron capture for exp 240 exp 242 Bk, exp 244 exp 246 exp 248 Es, exp 248 exp 250 Md nuclei have been measured. The data are analyzed by using the analytical expressions obtained which explicitly connect the delayed fission yields for the K-capture and beta decay to double-humped fission barrier parameters. As a result fission barrier heights for correspondent daughter nuclei are estimated (curium, californium, fermium isotopes). The fission barrier height for the nuclei investigated is found to be approximate to 6 MeV. For the whole group of nuclei it does not change drastically for an increase of Z, and with going far from the beta - stability line. (Atomindex citation 11:546243)

KFK-2838 PC **A03**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Angewandte Kernphysik 2.
Elastic Scattering of 104 MeV alpha Particles from exp 40 , exp 42 , exp 44 , exp 48 Ca and Determination of the Optical Potentials.
H. J. Gils, E. Friedman, H. Rebel, J. Buschmann, and S. Zagromski. Dec 79, 47p
U.S. Sales Only.

Differential cross sections for elastic scattering of 104 MeV alpha particles from exp 40 , exp 42 , exp 44 , exp 48 Ca have been measured with high angular accuracy over a wide angular range. Optical model analyses using different approaches for the potential form including a Fourier-Bessel description of the real potential reveal isotopic differences which, in particular for exp 48 Ca, indicate a small neutron skin. The model dependence of the extracted quantities is discussed in detail. (Atomindex citation 11:530342)

KFK-2932 PC **A03**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik.
Progress Report on Research and Development Activities 1979.
Feb 80, 34p
In German.
U.S. Sales Only.

A review is given about the work performed at the named institute. This concerns electron-positron experiments at the PETRA storage ring, experiments with fast neutrons at the 52 MeV cyclotron for the study of light nuclei, as well as the development of experimental methods for nuclear physics. (Atomindex citation 11:546260)

LA-8492 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Elastic Scattering of Tritons by Helium-4.
N. Jarmie, F. D. Correll, R. E. Brown, R. A. Hardekopf, and G. G. Ohlsen. Nov 80, 26p
Contract W-7405-ENG-36

Angular distributions of the differential cross section and of the analyzing power have been measured for the exp 4 He(t,t) exp 4 He reaction at 19 energies from 6 to 17 MeV. The relative errors of the cross section and analyzing power range from 2.0 to 2.5% and 0.005 to 0.01, respectively, and the scale errors are 1% in each case. Complete data tables are presented, and the experimental procedure is described for the present measurements and for earlier cross-section measurements. Graphs of the data are presented, as well as the curves resulting from an energy-independent phase-shift analysis. (ERA citation 06:006726)

LA-8538 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Exp 2 H(D,N) exp 3 He Differential Cross Sections for Deuteron Energies Between 20 and 40 MeV.
M. Drosg. Oct 80, 7p
Contract W-7405-ENG-36

From an energy-dependent analysis of all available data, Legendre coefficients are derived that allow a consistent presentation of the differential cross sections of the reaction exp 2 H(d,n) exp 3 He between 20.0 and 39.8 MeV. At energies above 25 MeV where no direct data are available, these coefficients predict cross sections of the neutron productions at 0 exp 0 to better than +- 10%. (ERA citation 06:006727)

LA-8548-T PC **A12**/MF **A01**
Los Alamos Scientific Lab., NM.
Relativistic off-Mass-Shell and off-Energy-Shell Scattering Theories: An Application of the Rotation and Lorentz Groups.
D. R. Giebink. Oct 80, 255p
Contract W-7405-ENG-36
Thesis. Submitted to Univ. of Texas, Austin.

A relativistic, phenomenological scattering theory for particles with arbitrary spin is presented, and the relation between off-mass-shell and off-energy-shell theories is discussed. The theory is formulated from the Hilbert-space representation of particles with spin in relativistic quantum mechanics. This topic is reviewed in a basis-independent manner by appealing to the properties of the rotation and Lorentz groups and their representations. Spin is discussed and a set of basis state vectors for the single-particle Hilbert space is derived from this perspective. Two- and three-particle Hilbert-space bases are then constructed, and angular momentum is discussed. The z-circumflex and helicity bases are presented as examples of the general procedure. These foundations allow the on-shell scattering amplitude to be defined. The space-inversion and time-reversal properties of this amplitude suggest that a new scattering function be defined such that a continuation of that function to negative energies can be considered. Antiparticle scattering events are associated with the continued function, and the CPT theorem arises as a natural consequence of this association. Moreover, these considerations lead to the definition of an off-mass-shell scattering function. The resulting off-mass-shell scattering theory has a number of very appealing properties. The off-energy-shell theory is dependent on fewer varia-

bles than the off-mass-shell theory, and is more susceptible to a phenomenological treatment. (ERA citation 06:008408)

LBL-11641 PC **A10**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Measurement of the Parity Nonconserving Neutral Weak Interaction in Atomic Thallium.
P. H. Bucksbaum. Nov 80, 214p
Contract W-7405-ENG-48
Thesis.

This thesis describes an experiment to measure parity nonconservation in atomic thallium. A frequency doubled, flashlamp pumped tunable dye laser is used to excite the 6P/sub 1/2/(F = 0) implies 7P/sub 1/2/(F = 1) transition at 292.7 nm, with circularly polarized light. An electrostatic field E of 100 to 300 V/cm causes this transition to occur via Stark induced electric dipole. Two field free transitions may also occur: a highly forbidden magnetic dipole M, and a parity nonconserving electric dipole epsilon/sub P/. The latter is presumed to be due to the presence of a weak neutral current interaction between the 6p valence electron and the nucleus, as predicted by gauge theories which unite the electromagnetic and weak interactions. Both M and epsilon/sub P/ interfere with the Stark amplitude beta E to produce a polarization of the 7P/sub 1/2/ state. This is measured with a circularly polarized infrared laser beam probe, tuned to the 7P/sub 1/2/ implies 8S/sub 1/2/ transition. This selectively excites m/sub F/ = +1 or -1 components of the 7P/sub 1/2/ state, and the polarization is seen as an asymmetry in 8S implies 6P/sub 3/2/ fluorescence when the probe helicity is reversed. The polarization due to M is delta /sub M/ = -2M/(BETAE). It is used to calibrate the analyzing efficiency. The polarization due to epsilon/sub P/ is delta /sub P/ = 2i epsilon/sub P//(beta E), and can be distinguished from delta /sub M/ by its properties under reversal of the 292.7 nm photon helicity and reversal of the laser direction. A preliminary measurement yielded a parity violation in agreement with the gauge theory of Weinberg and Salam. (ERA citation 06:006701)

LPCC-T-79-02 PC **A04**/MF **A01**
Caen Univ. (France). Lab. de Physique Corpusculaire.
Measurement and Interpretation of the Inclusive Reaction alpha D Implies alpha X at 3.98 GeV/C.
These (3e Cycle),
B. Marini. 1979, 69p
In French.
U.S. Sales Only.

The first results of the differential cross sections of elastic alpha d scattering at 3.98 GeV/c have been measured over a range .08<-t<1.8(GeV) exp 2 . In this experiment the incident alpha -particles beam extracted from the Saclay Saturne Synchrotron hits a liquid deuterium target and only the secondary alpha -particles are analyzed by means of an achromatic double focussing spectrometer. For /t/>.2(GeV) exp 2 , the experimental data on alpha d collisions exhibit a two-peak structure in the secondary alpha spectra which corresponds to elastic and quasi-elastic (with target deuteron break up) alpha d scattering. The quasi elastic parts of the spectra are analysed within the framework of the Glauber multiple scattering model. The values of the differential cross sections for elastic alpha d scattering are determined by subtracting the quasi-elastic contributions given by the theoretical calculation. The obtained differential cross sections, which clearly show the first and second diffraction minima, are compared with three models generalizing the multiple scattering theory to nucleus nucleus scattering. These models use simple gaussian nuclear densities without short range correlations and approximate the nucleon nucleon scattering amplitudes with a simple exponential dependence according to the optical theorem. The prediction of Czyz and Maximon model are the only ones to describe successfully the variations of the alpha d elastic differential cross section over the range of investigated transfers. (Atomindex citation 11:530070)

LYCEN-7971 PC **A03**/MF **A01**
Lyon-1 Univ., Villeurbanne (France). Inst. de Physique Nucleaire.
Towards a Parametrization of Multiparticle Hadronic Reactions.
M. Giffon, Y. Hama, and E. Predazzi. Nov 79, 42p
U.S. Sales Only.

An explicit parametrization of high energy exclusive production cross-sections is shown to give a reasonable account of inclusive data. This is a first step towards a phenomenological parametrization of multiparticle hadronic amplitudes. (Atomindex citation 11:530047)

OUP-79-10 PC **A02**/MF **A01**
Oslo Univ. (Norway). Fysisk Inst.
High Transverse Momentum mu exp + mu exp - Pairs Produced in Association with Hadron Jets in Hadron Reactions. A Laboratory for Quantum Chromodynamics.
T. Buran. 1979, 22p
U.S. Sales Only.

Some specific predictions of the quark-parton description of hadron-hadron interactions are discussed. Correction of the simple quark-parton results may be explained by the Quantum Chromodynamic (QCD) field theory. One unambiguous prediction of first order perturbation theory in QCD is high P(/sub T/ mu exp + mu exp - pairs produced in association with a hadron jet. A phenomenological description of these processes is given and it is stressed that they would form an important experimental verification of QCD. (Atomindex citation 11:530009)

PB81-139909
(Order as PB81-139859, PC **A05**/MF **A01**)
Beijing Univ. (China). Dept. of Physics.
A Check on Individual Terms of Nuclear Mass Formula,
Zeng Jinyan, Lin Chunzhen, and Yang Fujia. 10 Apr 80, 5p
Included in Scientia Sinica, v25 n12 p992-996 Dec 80.

The mass (or binding energy) is one of the fundamental properties of nuclei. In this paper, seven quantities are summarized and used to check one or two forms in a mass formula separately. The first three will be mentioned briefly since they have been discussed elsewhere. The nuclear mass formulae which are compared with each other are: the revised Weizsacker formula, the Myers-Swiatecki(M-S) formula, the Danos-Gillet (D-G) formula, and the formula proposed by the present authors.

PB81-859076 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Bubble Chamber Observations and Measurements of Particle Production. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Feb 81, 113p NERACSPNNT3107

This retrospective bibliography contains citations concerning bubble chamber observations, identifications, and measurements of particle productions in interactions between various types of particles and between various types of currents, e.g. changed-current interactions and neutral-current interactions. Interpretations of experimental results and considerations of theoretical explanations for particle productions at various energy levels are included. (Contains 90 citations, fully indexed and including a table of contents.)

PCCF-T-79-04 PC **A04**/MF **A01**
Clermont-Ferrand-2 Univ., Aubiere (France). Lab. de Physique Corpusculaire.
Experimental Study of the Production of Light Fragments in the alpha + alpha Interactions at Medium Energy.
M. M. Avome-Nze. 1979, 70p
In French.Thesis.
U.S. Sales Only.

The production of light nuclides exp 3 He, exp 4 He, exp 6 Li, exp 7 Li and exp 7 Be in the alpha + alpha interactions to 103 MeV and to 218 MeV of incident energy is studied. The technique of semiconductor telescope permitted identification of these nuclidesand measuremetn of their energy spectra and their angular range. The cross sections of different nuclides were measured by integration on energy E and on solid angle omega . The different values show that the alpha + alpha reactions can take prominent part in the production of helium-3. They appear sufficient to explain exp 6 Li abundance in the interstellar environment. On the contrary, the spallation is not sufficient to explain exp 7 Li abundance in the interstellar environment. (Atomindex citation 11:530288)

SLAC-PUB-2625 PC **A04**/MF **A01**
Stanford Linear Accelerator Center, CA.
Deep Inelastic Phenomena.
C. Y. Prescott. Oct 80, 53p CONF-800778-2
Contract AC03-76SF00515
18. course: the high energy limit, Erice, Trapani, Italy, 31 Jul 1980.

Nucleon structure as seen in the context of deep inelastic scattering is discussed. The lectures begin with consideration of the quark-parton model. The model forms the basis of understanding lepton-nucleon inelastic scattering. As improved data in lepton-nucleon scattering at high energies became available, the quark-parton model failed to explain some crucial features of these data. At approximately the same time a candidate theory of strong interactions based on a SU(3) gauge theory of color was being discussed in the literature, and new ideas on the explanation of inelastic scattering data became popular. A new theory of strong interactions, now called quantum chromodynamics provides a new framework for understanding the data, with a much stronger theoretical foundation, and seems to explain well the features of the data. The lectures conclude with a look at some recent experiments which provide new data at very high energies. These lectures are concerned primarily with charged lepton inelastic scattering and to a lesser extent with neutrino results. Furthermore, due to time and space limitations, topics such as final state hadron studies, and multi-muon production are omitted here. The lectures concentrate on the more central issues: the quark-parton model and concepts of scaling, scale breaking and the ideas of quantum chromodynamics, the Q exp 2 dependence of structure function, moments, and the important parameter R. (ERA citation 06:008391)

SLAC-PUB-2638 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
Neutrino Oscillations and Neutrino-Electron Scattering.
B. Kayser, and S. P. Rosen. Oct 80, 9p CONF-8010127-5
Contract AC03-76SF00515
Neutrino mass mini-conference, Cable, WI, USA, 1 Oct 1980.

Neutrino flavor oscillations can significantly alter the cross section for neutrino-electron scattering. As a result, such oscillations can affect the comparison between existing reactor data and theories of neutral-current processes. They may also lead to strikingly large effects in high-energy accelerator experiments. (ERA citation 06:008383)

20I. Plasma Physics

AD-A094 628/5 PC **A07**/MF **A01**
California Univ., Los Angeles. School of Engineering and Applied Science.
Chaotic Solutions of Nonlinear Wave-Wave Interacting Systems in Plasmas.
Interim rept.,
Koshiro Masui. Jun 80, 146p UCLA-ENG-8026, AFOSR-TR-81-0074
Grant AFOSR-79-0050

We study the chaotic behavior and phase locking in wave-wave interacting systems with linear damping or growth terms. For a two or three-wave interaction, the system equations are reducible to a real three-dimensional equation on a certain set, sigma, in the state space. For a three-wave interaction, the phases of the waves are locked on sigma. We consider only systems of positive-

energy waves whose reduced equations may have chaotic behavior for almost all initial conditions.

AD-A094 664/0 PC **A02**/MF **A01**
Michigan Univ., Ann Arbor. Coll. of Engineering.
Theoretical Studies of Laser Light Interaction and Optical and X-Ray Emission from Dense Metallic Plasmas.
Final rept. 1 Oct 79-1 Oct 80,
J. J. Duderstadt, R. S. B. Ong, J. P. Sheerin, S. Freije, and A. Schmitt. Nov 80, 25p AFOSR-TR-81-0075
Grant AFOSR-80-0029

The behavior of the pulse of a high intensity laser beam is investigated as the beam penetrates into a low temperature high density plasma. Given the physical characteristics of the target plasma a study is made of the evolution of the incident laser pulse as it propagates through the plasma. A study is made of the dynamics of the strongly turbulent plasma generated by the interaction of an intense laser beam and the background plasma. The strongly turbulent plasma can be viewed as a collection of localized highly nonlinear electric field structures (solitons). The behavior of a laser heated aluminum exploding wire plasma is investigated by means of a radiation transport mdoel for line radiation. MHD computer codes with nonequilibrium ionization dynamics are developed for the analysis. The physics of a strongly coupled plasma is studied via an appropriate kinetic model. The dynamic structure factor which enables one to interpret the scattered light from the plasma due to laser radiation is obtained. This is very essential tool for diagnostics of such strongly coupled plasmas. (Author)

AD-A095 175/6 PC **A02**/MF **A01**
Naval Research Lab., Washington, DC.
A Plasma Probe System with Automatic Sweep Adjustment.
Memorandum rept.,
J. C. Holmes, and E. P. Szuszczewicz. 23 Feb 81, 23p Rept no. NRL-MR-4424

The capabilities of the pulsed Langmuir probe technique have been expanded to operate in charged particle environments having spatial and temporal variations in plasma or reference-electrode potentials. this practice is implemented by logic circuitry which tracks local floating potentials and adjusts automatically the sweep center voltage to guarantee a complete current-voltage characteristic with minimum sweep voltage excursion. (Author)

DOE/ER/03077-165 PC **A04**/MF **A01**
New York Univ., NY.
Hall Current Effects on Tearing Modes in Rotating Reverse Field Plasmas.
J. Kappraff, W. Grossmann, and M. Kress. Mar 80, 63p
Contract AC02-76ER03077

It has been experimentally observed for some time that certain tearing modes in plasmas may be suppressed if the plasma rotates in a preferred direction. In this paper we treat the m=0, finite wavelength tearing mode in cylindrical geometry for a reversed field plasma equilibrium and show that by generalizing Ohm's law to include Hall current terms, we are able to explain this effect of rotation on tearing modes. Our results agree qualitatively with earlier analysis and numerical simulations of A. Kaleck. We also show that our results are sensitive to the position of the outer conducting wall, and for wall positions sufficiently close to the plasma vacuum interface, tearing modes may be quenched when the rotation reaches a critical value. These results follow from a boundary layer analysis and numerical integration of the boundary layer equations. (ERA citation 06:006778)

DOE/ET/53034-62 PC **A02**/MF **A01**
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
Numerical and Analytical Investigation of Nonlinear Properties of Plasmas and Experimental Studies of Cusp Confinement and of CTR Plasmas. Progress Report (Theory Part), 1 September 1979-30 April 1980.
G. E. Knorr, and N. Hershkowitz. May 80, 16p
Contract AC02-76ET53034

Summaries of research are given for the 15 acres theoretically investigated. (ERA citation 06:008465)

DOE/ET/53051-13 PC **A10**/MF **A01**
Wisconsin Univ.-Madison.
Plasma Resistivity Measurements in the Wisconsin Levitated Octupole.
D. A. Brouchous. Nov 80, 209p
Contract AS02-76ET53051

Resistivity measurements parallel to the magnetic field were made on gun injected plasmas ranging in density from 10 exp 9 cm exp -3 to 10 exp 1 parallelcm exp -3 in the Wisconsin levitated octupole with toroidal and poloidal magnetic fields. The 10 exp 9 cm exp -3 plasma was collisionless with lambda/sub mfp/ > 100 mirror lengths, had T/sub e/ = 10 eV, T/sub i/ = 30 eV and was found to have anomalous resistivity scaling like eta = sqrt T/sub e//n/sub e/ when E/sub parallel/ > E/su c/ is the Dreicer critical field. The 10 exp 12 cm exp -3 plasma was collisional with lambda/sub mfp/ < mirror length, had T/sub e/ = T/sub i/ approx. = .2 eV and was found to have Spitzer resistivity when E/sub parallel/ < E/sub c/. (ERA citation 06:006780)

DOE/ET/53051-14 PC **A02**/MF **A01**
Wisconsin Univ.-Madison.
Cross Field Diffusion and Fluctuation Spectra in a Levitated Octupole in the Presence of a Toroidal Field.
A. B. Ehrhardt, H. R. Garner, G. A. Navratil, and R. S. Post. Nov 80, 24p
Contract AS02-76ET53051

The diffusion coefficient, D/sub perpendicular to/, for a collisionless hydrogen plasma was measured in the Levitated Octupole when a weak toroidal field was added. A 20-fold decrease in the anomalous diffusion was observed with B/sub T//B/sub P/ approx. 0.1. Since the plasma is collisionless locally trapped particles in the poloidal field mirrors allows the convective cell activity (f < 600 Hz) to persist even when toroidal field was added. A shift in the k/sub perpendicular to/ spectrum to shorter wavelengths was noted. Measurements and calculations indicate that the higher frequency portion of the spectrum (f > 600 Hz) cannot be responsible for the observed diffusion. (ERA citation 06:008466)

EFI-361(19)-79 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Electromagnetic Wave Propagation in the Waveguide with Moving Anisotropic Medium.
A. D. Ter-Pogosyan. 1979, 18p
In Russian.
U.S. Sales Only.

Wave propagation in the waveguide with moving anisotropic medium having an anisotropy axis directed along a waveguide axis is considered. The waves are divided into E-and H-types. The coupling of the field components is obtained in terms of longitudinal components of electric and magnetic fields. The energy density of the two wave types is calculated for the anisotropic medium with dispersion. The boundary problem has been solved too, and the Brewster condition has been determined. The incidence of both types of waves on the plasma moving over the strong longitudinal magnetic field is considered. (Atomindex citation 11:549210)

ITF-78-161R PC **A03**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Continuous Symmetries of Longitudinal, Motions of Collisionless Plasma, Invariant Solutions and Conservation Laws.
V. B. Taranov. 1979, 30p
In Russian.
U.S. Sales Only.

The set of Vlasov-Poisson equations is considered for one-dimensional nonlinear longitudinal oscillations of a collisionless plasma in two cases: a) many-component plasma; b) electron plasma. Continuous symmetry groups are obtained. These results allowed us to classify invariant exact solutions and to find nontrivial laws of conservation. (Atomindex citation 11:529725)

ITF-79-55R PC **A03**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Potential Field Theory in a Plasma with a Random Scattering Boundary.
A. S. Usenko, and I. P. Yakimenko. 1979, 31p
In Russian.
U.S. Sales Only.

The potential of interaction between charged particles in a semi-infinite plasma is determined on the basis of solving the boundary-value problem of the theory for the case of nonlocal medium. It is shown that this potential is invariant with respect to the models of boundary from a wide class which is characterized by the condition of equality of the incident and scattering particle flows. The numerical and analytic investigations of peculiarities of this potential as compared with Coulomb and Debye distributions is carried out in detail. (Atomindex citation 11:529731)

ITF-79-88R PC **A03**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Fluctuation Theory of Bremsstrahlung from a Bounded Plasma.
A. G. Zagorodnii, A. S. Usenko, and I. P. Yakimenko. 1979, 32p
In Russian.
U.S. Sales Only.

Within the nonlinear fluctuation theory the correlation functions of the sources and the intensities of the bremsstrahlung radiation from the half-space of nonequilibrium plasma are calculated in the dipole and quadrupole approximations. As a result of the analysis of some typical examples of the nonequilibrium systems (such as plasma with the charged particle flows and high-energy electron components) it is shown that the level of the bremsstrahlung radiation on the combination frequencies may be sufficiently higher than the ordinary level of the nonresonant radiation. (Atomindex citation 11:529750)

ITP-79-53E PC **A02**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Nonlinear Fluctuation-Dissipation Theorem for a Plasma in the Case of a Nonpotential Field.
A. G. Sitenko, and A. Yu. Kargin. 1979, 21p
U.S. Sales Only.

Linear and nonlinear plasma responses to an external nonpotential perturbation field are considered. It is shown that besides the usual fluctuation-dissipation theorem which relates the quadratic correlation function for the current density fluctuations and the linear electric susceptibility tensor, there exist the higher-order relations connecting the correlation functions for the higher-order current density fluctuations with the nonlinear susceptibilities. (Atomindex citation 11:529712)

ORNL/TM-7520 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Modification of the Tearing Mode Growth Rate by the Presence of a Stochastic Magnetic Field.
B. A. Carreras, M. N. Rosenbluth, and H. R. Hicks. Dec 80, 17p
Contract W-7405-ENG-26

We have studied the effect of a stochastic magnetic field on the growth of a tearing mode. An analytic solution is given for the case in which the stochastic magnetic field is static. In that case, an unstable tearing mode is further destabilized (stabilized) if the delta ' values of the nonlinearly driven modes are positive (negative). This mechanism explains the destabilization of the (m = 3; n = 2) tearing mode observed in nonlinear three-dimensional calculations. (ERA citation 06:008471)

PAT-APPL-6-088 223 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Electron Energy Recovery System for Negative Ion Sources.
Patent Application,
W. K. Dagenhart, and W. L. Stirling. Filed 25 Oct 79, 8p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An electron energy recovery system for negative ion sources is provided. The system, employing crossed electric and magnetic fields, separates the electrons from the ions as they are extracted from the ion source plasma generator and before the ions are accelerated to their full energy. With the electric and magnetic fields oriented 90 exp 0 to each other, the electrons remain at approximately the electrical potential at which they were generated. The electromagnetic forces cause the ions to be accelerated to the full accelerating supply voltage energy while being deflected through an angle of less than 90 exp 0 . The electrons precess out of the accelerating field region into an electron recovery region where they are collected at a small fraction of the full accelerating supply energy. It is possible, by this method, to collect > 90% of the electrons extracted along with the negative ions from a negative ion source beam at < 4% of full energy. (ERA citation 06:004608)

PB81-146805 PC **A02**/MF **A01**
Pennsylvania Univ., Philadelphia. Dept. of Mechanical Engineering and Applied Mechanics.
Wall Emission Dominated Discharge Channel,
Ira M. Cohen. May 80, 24p MEAM-80-1, NSF/RA-800343
Grant NSF-ENG78-25899

Diffusion of ions and electrons through a uniform neutral gas was studied under complete wall emission-absorption boundary conditions to understand more clearly the role of emitting and absorbing electrodes in MHD type channel flows. All other effects including temperature gradients, volumetric ionization, and recombination processes were ignored to obtain a closed form exact solution for charged and seed neutral particle densities and a self-consistent electric field. From these solutions, current-voltage characteristics of the discharge channel were calculated and found to have the form of ordinary ionization chamber characteristics. For small Debye length, cathode and anode space charge sheaths had exponential density profiles indicating that the densities were in equilibrium with the self-consistent electric field. Electron densities near the cathode were extremely high due to thermionic emission, and ion densities were elevated above quasi-neutral regime values in the anode sheath. Electric current between electrodes increased rapidly at first, then saturated with increasing voltage between them.

PB81-858078 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Boltzmann Statistics Applied to Plasmas. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 94p NERACSPNNT2921

This retrospective bibliography contains citations concerning the use of Boltzmann statistics in analyzing and simulating natural and man-made plasmas. Topics include kinetics of slightly relativistic plasmas, plasma turbulence in a magnetic field, trapped-particle instability, plasma waves (drift waves), laser plasma interactions, electron transport in laser produced plasmas, low-pressure gas discharge, TOKAMAK plasmas, and electrode phenomena in low-temperature plasmas. (Contains 81 citations, fully indexed and including a table of contents.)

PPPL-1724 PC **A03**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Stability of Colliding Ion Beams.
E. A. Foote, and R. M. Kulsrud. Nov 80, 39p
Contract AM02-76CH03073

We determine conditions for stability of two identical colliding ion beams in the presence of neutralizing electrons, but no background ions. Such a situation is envisioned for the Counterstreaming Ion Torus. The ion beams are taken to be Maxwellian in their frames of reference. The approximation of electrostatic and electromagnetic modes is made. The stability of the electrostatic modes depends on the relation between the ion electron temperature ratio and the relative beam velocities. The stability of the electromagnetic mode depends on the relation between the ion plasma beta and the relative beam velocities. (ERA citation 06:008474)

PPPL-1735 PC **A03**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Integral-Equation Formulation for Drift Eigenmodes in Cylindrically Symmetric Systems.
R. Linsker. Dec 80, 26p
Contract AM02-76CH03073

A method for solving the integral eigenmode equation for drift waves in cylindrical (or slab) geometry is presented. A leading-order kinematic effect that has been noted in the past, but incorrectly ignored in recent integral-equation calculations, is incorporated. The present method also allows electrons to be treated with a physical mass ratio (unlike earlier work that is restricted to artificially small m/sub i//m/sub e/ owing to resolution limitations). Results for the universal mode and for the ion-temperature-gradient driven mode are presented. The kinematic effect qualitatively changes the spectrum of the ion mode, and a new second region of instability for k/sub perpendicular to/rho/sub i/ greater than or equal to 1 is found. (ERA citation 06:008475)

20J. Quantum Theory

AD-A094 966/9 PC **A02**/MF **A01**
Princeton Univ., NJ. Dept. of Physics.
The Thouless Conjecture for a One-Dimensional Chain,
P. W. Anderson, and P. A. Lee. 21 Jan 81, 14p
Contract N00014-77-C-0771, Grant NSF-DMR78-03015
Errata sheet inserted. Prepared in cooperation with Bell Labs., Murray Hill, NJ.

The Thouless conjecture relating energy level shifts as a function of boundary conditions to conductance is shown to be incorrect in detail in the one-dimensional chain, though qualitatively correct: the dimensionless conductances defined by scattering theory and by Thouless' conjecture are functions of each other. (Author)

AD-A094 994/1 Not available NTIS
Center for Naval Analyses, Alexandria, VA. Naval Warfare Analysis Group.
Comment on Discretization Problems for Functional Integrals in Phase Space.
Professional paper,
Maurice M. Mizrahi. 25 Feb 80, 9p Rept no. CNA-PP-281
Availability: Pub. in Physical Review D, v22 n8 p2096-2101, 15 Oct 80 (No copies furnished by DTIC/NTIS).

No abstract available.

PB81-858789 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Bootstrap Models in Quantum Field Theory. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 70p NERACSPNNT2750

This retrospective bibliography contains citations concerning bootstrap theory, models, and equations used in quantum field theory. Strong and weak particle interactions are considered for various particles and bootstrap configurations. Some attention is given to comparisons of the bootstrap approach with other approaches. (Contains 64 citations, fully indexed and including a table of contents.)

PB81-858797 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Bag Models in Quantum Chromodynamics and Quantum Electrodynamics. January, 1970-December, 1980 (Citations from the Searchable Physics Information Notices Data Base).
Rept. for Jan 70-Dec 80.
Jan 81, 90p NERACSPNNT2952

This retrospective bibliography contains citations concerning bag models and theories in quantum chromodynamics and quantum electrodynamics. Citations consider quark-quark interactions, quark-antiquark interactions, and other particle interactions encountered in quantum field theory. Considerations of gauge symmetry, gauge invariance, and symmetry breaking are also included. (Contains 80 citations, fully indexed and including a table of contents.)

20K. Solid Mechanics

AD-A094 712/7 PC **A03**/MF **A01**
Army Armament Research and Development Command, Watervliet, NY. Large Caliber Weapon Systems Lab.
Beam Motions under Moving Loads Solved by Finite Element Method Consistent in Spatial and Time Coordinates.
Technical rept.,
Julian J. Wu. Nov 80, 26p ARLCB-TR-80046, AD-E440 103
Published in Proceedings of the Conference of Army Mathematicians (26th), Cold Regions Research and Engineering Lab, Hanover, NH, 10-12 June 80.

A solution formulation and numerical results are presented here for the time-dependent problem of beam deflections under a moving load which can be neither a force nor a mass. The basis of this approach is the variational finite element discretization consistent in spatial and time coordinates. The moving load effect results in equivalent stiffness matrix and force vector which are evaluated along the line of discontinuity in a time-length plane. Numerical results for several problems have been obtained, some of which are compared with solutions obtained by Fourier series explanations.

AD-A094 763/0 PC **A10**/MF **A01**
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
Wave Propagation Problems in Certain Elastic Anisotropic Half Spaces.
Doctoral thesis,
Constantine G. Caracostis, and Arthur R. Robinson. Dec 80, 213p Rept nos. UILU-ENG-80-2022, SRS-487
Contract N00014-75-C-0164

The Smirnov-Sobolev method of self-similar potentials is used to solve certain wave propagation problems in anisotropic media. The solutions are expressed in terms of analytic functions which are determined from the boundary conditions in a straightforward manner. Two types of problems are considered. The first type concerns the two-dimensional case of an orthotropic material under plain-strain conditions subjected to a suddenly applied line force on the surface or in the interior of a half space. The second type treats the three-dimensional problem of a point force suddenly applied on the surface of a transversely isotropic half space. This solution is formed, in general, by a rotational superposition of the solutions for a plane strain and for an antiplane problem with appropriately defined boundary conditions. The mapping of the wave fields in the complex domain composed of a four-sheeted Riemann surface is examined in detail. Some of the techniques used in the numerical treatment of certain singularities are briefly discussed. The numerical results are given in the form of the time histories for the displacements and stresses in the two-dimensional case and as time histories of only the displacements in the three-dimensional case. (Author)

AD-A094 901/6 PC **A03**/MF **A01**
Universal Energy Systems, Inc., Dayton, OH .
Use of Reissner's Variational Principle in Finite Element Analysis of Crack Problems.
Final rept. Jun-Sep 80,
Jalees Ahmad. Dec 80, 31p AFWAL-TR-80-4182
Contract F33615-79-C-5129

For the purpose of accurately estimating linear elastic fracture parameters by finite element method, the use of Reissner's variational principle as a basis is investigated. Results of two-dimensional analyses performed on three-point bend, compact tension, and ring tension geometries compare well with other solutions available in the

literature. Results of three-dimensional analyses of three-point bend and ring geometries are also presented. The method appears to be particularly useful in studying through the thickness variation or Mode I stress intensity factors. (Author)

AD-A094 952/9 Not available NTIS
Stanford Univ., CA. Div. of Applied Mechanics.
Harmonic Wave Propagation in a Periodically Layered, Infinite Elastic Body: Plane Strain, Numerical Results,
T. J. Delph, G. Herrmann, and R. K. Kaul. Oct 78, 7p
Contract N00014-76-C-0054
Prepared in cooperation with State Univ. of New York at Buffalo. Contract N00014-75-C-0302.
Availability: Pub. in Jnl. of Applied Mechanics, v47 n3 p531-537 Sep 80 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A095 146/7 PC **A06**/MF **A01**
MARC Analysis Research Corp., Palo Alto, CA.
Knowledge Based Consultation for Finite Element Structural Analysis.
Final rept. Oct 77-May 80,
J. M. Rivlin, M. B. Hsu, and P. V. Marcal. May 80, 114p AFWAL-TR-80-3069
Contract F33615-78-C-3206

In recent years, techniques of 'heuristic programming' have been applied to various fields of science and engineering. An attempt has been made, during the current investigation, to develop a knowledge based consultation system and to establish a finite element structural analysis knowledge based for the use of the MARC program, a general purpose finite element analysis program. Backward chaining logic is adopted into the current system and the inference engine is written in Fortran. The knowledge based deals with information on pre-analysis, and post-analysis stages of a structural analysis problem. Rules in the knowledge base are executed through the use of user input keywords. The consultation system is currently operational on the Prime 400 Computer System. (Author)

N81-16428/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Miniature Drag-Force Anemometer.
L. N. Krause, and G. C. Fralick. 1981, 17p NASA-TM-81680, E-706
Proposed for Presentation at the 2ND Intern. Symp. And Ind., St. Louis, 6-10 Apr. 1981; Sponsored by Asme, the Isa and NBS.

A miniature drag force anemometer is described which is capable of measuring unsteady as well as steady state velocity head and flow direction. It consists of a cantilevered beam with strain gages located at the base of the beam as the force measuring element. The dynamics of the beam are like those of lightly damped second order system with a natural frequency as high as 40 kilohertz depending on beam geometry and material. The anemometer is used in both forward and reversed flow. Anemometer characteristics and several designs are presented along with discussions of several applications.

N81-16492/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Experimental Compliance Calibration of the Compact Fracture Toughness Specimen.
D. M. Fisher, and R. J. Buzzard. Dec 80, 11p NASA-TM-81665, E-685

Compliances and stress intensity coefficients were determined over crack length to width ratios from 0.1 to 0.8. Displacements were measured at the load points, load line, and crack mouth. Special fixturing was devised to permit accurate measurement of load point displacement. The results are in agreement with the currently used results of boundary collocation analyses. The errors which occur in stress intensity coefficients or specimen energy input determinations made from load line displacement measurements rather than from load point measurements are emphasized.

N81-16495/6 PC **A08**/MF **A01**
European Space Agency, Paris (France).
On the J-Integral and Other Evaluation Methods of Elastic-Plastic Fracture Mechanics and on the Limits of Applicability of Linear-Elastic Fracture Mechanics.
Ph.D. Thesis - Tech. Hochschule, Aachen.
H. P. Keller. Oct 80, 156p ESA-TT-617, DFVLR-FB-79-03
Transl. Into English of "Ueber das J-Integral U. Andere Auswerteverfahren der Fliessbruchmech. Sowie ueber die Gueltigkeitsgrenzen der Linear-Elastischen Bruchmech." Dfvlr, Cologne Report Dfvlr-FB 79-03, Jan. 1979. Original Report in German Previously Announced as Esa-93718.

The critical stress intensity factor for the onset of crack extension was determined by means of linear-elastic fracture mechanics and the various methods of elastic-plastic fracture mechanics, with emphasis on the J-integral method. The specimens used varied in size and were prepared from three steels and two aluminum alloys. The investigations show that linear-elastic fracture mechanics are applicable to specimens far smaller than those stipulated in the standard. The J-integral can be used to determine the critical stress intensity factor for the onset of crack extension for even smaller specimens when crack propagation is ductile, regardless of specimen size. The other methods of elastic-plastic fracture mechanics used were the equivalent energy method and the Eftis and Liebowitz method. Both can also be used to determine the critical stress intensity for ductile crack propagation in small specimens.

PB81-159311
(Order as PB81-159196, PC **A07**/MF **A01**)
China Univ. of Science and Technology, Beijing.
The Relation Between Crack Opening Displacement and Strain,
Qi Jingtai, and Cai Shutang. 13 Jun 78, 13p
Included in Scientia Sinica, v23 n10 p1326-1338 Oct 80.

In this paper, in line with the method developed by Karmin-Tsien for subsonic flow and through the establishment of a 'bielastic' model, theoretical relations between COD (cracking opening displacement) and strain and some practical examples are calculated. In the case of wide plates, all the calculated theoretical results fall in the band of dispersion of experimental data. The relations between experimental results and material characteristics as well as experimental conditions are also explained theoretically. The results of this paper are verified not only by the wide plate experiments but also by the results presented in a referenced report. The results obtained can be evidently applied to the analysis of tolerable limit of the strained crack in pressure vessels.

20L. Solid-State Physics

AD-A094 869/5 PC **A02**/MF **A01**
Princeton Univ., NJ. Joseph Henry Lab. of Physics.
Further Remarks on Metastability in Amorphous Semiconductors.
Technical rept.,
D. C. Licciardello. 26 Jan 81, 12p
Contract N00014-77-C-0711, Grant NSF-DMR80-2063

No abstract available.

AD-A094 871/1 PC **A02**/MF **A01**
Princeton Univ., NJ. Dept. of Physics.
Magnetic Order and Energetics of Dipolar Coupling in Magnetic Superconductors.
Technical rept.,
Martha Redi, and P. W. Anderson. 21 Jan 81, 14p
Contract N00014-77-C-0711, Grant NSF-DMR78-03015

The exact (not just nearest neighbor) dipolar coupling energy densities for the observed structures of the rare earth Chevrel compounds are calculated by the method of Luttinger and Tisza. The dipolar coupling energy density for the most probable spin configuration is comparable to the observed magnetic transition temperature but the most probable ground state is not found experimentally. The discrepancy between the observed magnetic ground state and that predicted from dipole coupling may arise from conduction electron effects or possibly some strong crystal field effect and should be included in any electronic theory of the superconductive state below T(M). (Author)

AD-A094 887/7 PC **A03**/MF **A01**
Cambridge Univ. (England). Cavendish Lab.
Carrier Localisation in Inversion Layers and Impurity Bands.
Annual technical rept. Sep 79-Nov 80,
M. Pepper. Nov 80, 32p
Grant DA-ERO-78-G-098

This report contains results on the ballistic injection of electrons between Al and n+ Si and Al and the Si inversion layer. This was the first experiment on ballistic injection between a semiconductor and a metal, and yielded results of considerably greater clarity than those found from the all metal work. Basically the phonons responsible for intervalley scattering can be clearly observed and the technique offers a means of identifying the various subbands in the Si inversion layer. Plasmons could be observed and in future it is planned to extend this technique to III-V semiconductors. The other area of research described in this report is a collaborative experiment with Dr. K. von Klitzing and Dr. G. Dorda. It is shown that the Hall resistance of a MOSFET, when the conduction band is quantized by a strong magnetic field, is related simply to the fine structure constant. The experiment is described in detail. (Author)

AD-A094 904/0 PC **A02**/MF **A01**
Texas Univ. at Arlington. Dept. of Physics.
Hartree Band Structure, Fermi Surface, and Nesting Wave Vector for Paramagnetic Chromium,
J. L. Fry, N. E. Brener, J. L. Thompson, and P. H. Dickinson. 9 Feb 79, 8p AFOSR-TR-81-0101
Grant AFOSR-76-2981
Pub. in Physical Review B, v21 n2 p384-390, 15 Jan 80.

No abstract available.

AD-A094 905/7 PC **A02**/MF **A01**
Texas Univ. at Arlington. Dept. of Physics.
Time-Dependent Hartree-Fock Dielectric Function for the Uniform Electron Gas,
N. E. Brener, and J. L. Fry. 5 Feb 79, 9p AFOSR-TR-81-0102
Grant AFOSR-76-2981
Pub. in Physical Review B, v22 n6 p2737-2743, 15 Sep 80.

No abstract available.

AD-A094 929/7 PC **A02**/MF **A01**
Stanford Univ., CA. Edward L. Ginzton Lab. of Physics.
Amorphous Superconductors Based on the 4d Series,
S. J. Poon, and W. L. Carter. 31 Mar 80, 4p GL-3140, AFOSR-TR-81-0012
Contract F49620-78-C-0009
Pub. in Solid State Communications, v35 n3 p249-251 1980.

No abstract available.

AD-A095 121/0 PC **A02**/MF **A01**
Princeton Univ., NJ. Joseph Henry Lab. of Physics.
Hall Effect Near the Mobility Edge: A Scaling Argument.
Technical rept.,
Boris Shapiro. 26 Jan 81, 6p
Contract N00014-77-C-0711

Critical behaviour of the zero temperature Hall constant in a disordered electronic system is considered. It is shown, by means of a scaling argument, that near (above) the mobility edge Ec the Hall constant R diverges according to R(E) approximate (E-Ec) to the -t power, where t is the conductivity exponent. (Author)

AD-A095 151/7 PC **A06**/MF **A01**
Northeastern Univ., Boston, MA.

Phonon Self-Energies in Weakly and Strongly Anharmonic Systems.
Final rept. Jun 75-Dec 80,
Robert P. Lowndes. 11 Dec 80, 107p ARO-10392.14-P, ARO-12918.10-P
Grants DA-ARO-D-31-124-72-G125, DAHC04-75-G-0166

The interatomic forces in a crystal are usually strongly dependent on the interatomic spacing and consequently the lattice potential energy for a crystal can generally be written as a power series in the displacements of the atoms from their equilibrium positions. If such an expansion is terminated at the quadratic terms, then this constitutes the so-called harmonic approximation. In the harmonic approximation the lattice vibrations are true normal modes such that if energy is channeled uniquely into any one lattice mode, then it will remain undissipated in that mode. The harmonic approximation would therefore predict, for instance, that the scattering cross section for neutrons by a Bravais lattice would consist of a set of 8 function peaks or, analogously, that the spectral profiles of lattice vibrations would be a set of undamped temperature independent resonances. These and other such predictions are, of course, in marked discord with experimental results. It is therefore clear that the anharmonic terms in a lattice potential must be considered if a full understanding of many of the physical properties of solids is to be achieved. (Author)

ORNL/TM-7517 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Dependence of Stability of Metastable Superconductors on Copper Fraction.
S. A. Elrod, J. W. Lue, J. R. Miller, and L. Dresner. Dec 80, 40p
Contract W-7405-ENG-26

The stability of composite superconductors operating in the metastable regime depends upon such factors as matrix resistivity, cooled surface dimensions, fraction of critical current, and volume fraction of stabilizer. By assuming constant thermophysical properties, we developed analytic expressions for the energy and voltage of the minimum propagating zone (MPZ). With other factors held constant, these expressions have been used to predict composite superconductor stability as a function of copper fraction: lower copper fractions lead to higher MPZ energies. MPZ voltages have been measured for three NbTi/Cu composites having different copper fractions and different critical current densities for several magnetic fields and transport currents. Experimental MPZ voltages have been used to calculate an effective heat transfer coefficient, which is subsequently used to calculate the MPZ energy. The experimental MPZ energies support the theoretical expectation that lower copper fractions lead to higher stability in the metastable regime. (ERA citation 06:008059)

PB81-859753 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Amorphous Alloys: Magnetic Properties. January, 1966-December, 1980 (Citations from the Metals Abstracts Data Base).
Rept. for Jan 66-Dec 80.
Feb 81, 189p NERACASMNT3159

This retrospective bibliography contains citations on the magnetic properties of amorphous alloys. Both ferrous and non-ferrous alloys are included. Magnetostriction, magnetic anisotropy, magnetic permeability, magnetic moments and magnetoresistivity are discussed in terms of alloying constituents and their concentration in the alloy. (Contains 245 citations, fully indexed and including a table of contents.)

20M. Thermodynamics

AD-A094 759/8 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
A Study of Free Convection in an Inclined, Rectangular Cavity.
Master's thesis,
Mohammad Khalid Khan. Dec 80, 108p Rept no. AFIT/GAE/AA/80D-13

A small experimental apparatus was designed for the measurement of heat flux across an enclosed, rectangular air cavity, which could be placed at any angle of inclination. The heat flux evaluation was done with the help of an interferometer. Heat flux was determined for five aspect ratios, each placed at four different angles and two different temperature differences for each setting. The average Nusselt number was found to be primarily a function of Grashof number or Rayleigh number. Three correlation equations developed by earlier studies are fitted to the data. The correlation equations are found to approximate the heat flux within + or - 11%, up to a Grashof number of 1.2 million. (Author)

AD-A094 870/3 PC **A03**/MF **A01**
Princeton Univ., NJ. Dept. of Physics.
Some General Thoughts about Broken Symmetry.
Technical rept.,
P. W. Anderson. 21 Jan 81, 29p
Contract N00014-77-C-0711, Grant NSF-DMR78-03015

The emphasis in this talk will be on the precise characterization of the term 'broken symmetry' and the phenomena associated with it. We will examine to what extent one may generalize to random systems and to 'dissipative structures'. Thermal equilibrium broken symmetry is characterized by an order parameter eta(r) which is thermodynamic variable with a physical conjugate force field X, and by a free energy dependent upon eta(r); from these properties follow not only the Landau thermodynamics but also the phenomena of generalized rigidity, Goldstone collective excitations, and topologically stable defects. We conjecture what may be the consequences of relaxing these assumptions. (Author)

AD-A094 972/7 PC **A02**/MF **A01**
Princeton Univ., NJ. Joseph Henry Lab. of Physics.
Symmetry Breaking Far from Equilibrium.
Technical rept.,
L. Sneddon. 21 Jan 81, 17p
Contract N00014-77-C-0711

An examination of the Rayleigh-Benard convection experiment shows that the defining features of long-range order and spontaneous symmetry breaking as they occur in equilibrium transitions, are also observed far from equilibrium. The broken symmetry is not, as has been suggested, translational invariance, but rather a discrete symmetry under velocity reversal. Some experimental consequences of these observations are outlined. (Author)

INIS-mf-5732 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Are the Dynamical Properties of Liquid Helium Simpler Than We Thought. New Evidence from Neutron Scattering.
A. D. B. Woods. 13p CONF-7906178-3
Canadian Association of Physicists annual congress, Vancouver, Canada, 18 Jun 1979.
U.S. Sales Only.

Neutron diffraction studies of liquid helium led to a simplified model of the temperature dependence of elementary excitations around the lambda-point. (Atomindex citation 11:530164)

LA-8250-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Thermodynamic Properties of Fluid exp 4 He in the 75 to 300 exp 0 K and 2- to 20-Kbar Range.
D. H. Liebenberg, R. L. Mills, and J. C. Bronson. Oct 80, 31p
Contract W-7405-ENG-36

Helium is the simplest noble gas and is the second most abundant element in the universe. Helium properties are required for the use of helium in energy technologies, basic physical research studies, and astrophysical modeling. This report summarizes new pressure, volume, temperature, and sound velocity measurements on exp 4 He in the ranges 75 to 300 exp 0 K and 2 to 20 kbar. From an equation of state (EOS) fitted to these data, are calculated and tabulated the thermodynamic quantities: volume V, sound velocity v/sub s/, thermal expansivity alpha /sub p/, heat capacity at constant pressure C/sub p/, the ratio of specific heats gamma , adiabatic compressibility chi/sub s/, and molar entropy S. Computer-drawn graphs of the isothermal pressure variation of these quantities are presented and the precision of the fits to the data is discussed. Comparison with other measurements is described in the limited region of overlap, that is, at less than 10 kbar and near room temperature. (ERA citation 06:006686)

PB81-160939 Not available NTIS
National Bureau of Standards, Washington, DC.
Transient Pool Boiling of Liquid Helium Using a Temperature-Controlled Heater Surface.
Final rept.,
P. J. Giarratano, and N. V. Frederick. 1980, 12p
Sponsored in part by Air Force Office of Scientific Research, Bolling AFB, DC.
Pub. in Proc. Cryogenic Engineering Conf., Madison, WI., Aug. 21-24, 1979, Paper in Advances in Cryogenic Engineering, 25 p455-466 1980.

The entire boiling curve of input heat flux versus temperature rise, q vs. Delta T, including transition boiling was obtained for various heating rates of dT/dt ranging from 0 (steady state) to approximately 7500 k/s. This was achieved by using a specially designed electronic temperature controller to linearly vary the temperature versus time of a carbon film heater surface submerged in a liquid helium bath.

20N. Wave Propagation

AD-A095 034/5 MF **A01**
Naval Ocean Systems Center, San Diego, CA.
VLF/LF Atmospheric Noise Recorder: Theory, Operation, and Maintenance.
Final rept. Feb 79-Jul 80,
R. K. Cernius. 25 Jul 80, 74p Rept no. NOSC/TD-369
Availability: Microfiche copies only.

An analog noise recording system is described which is capable of 80-dB dynamic range recording and playback of vlf/lf noise phenomena in bandwidths up to 3 kHz. (Author)

AD-A095 172/3 PC **A06**/MF **A01**
Advanced Research and Applications Corp., Sunnyvale, CA.
Characterization of Photoelectron Emission for SGEMP Analysis.
Final rept. 1 Jan 79-30 Apr 80,
Melvin J. Bernstein. 1 May 80, 123p ARACOR-TR-38-2, DNA-5395F
Contracts DNA001-79-C-0101, DNA001-77-C-0129

Photoelectron emission characteristics from SGEMP-relevant materials have been determined using both pulsed and steady-state x radiation in the 1-6 keV range. The photoemission parameters determined were spectral yields of primary electrons and total yields of secondary electrons. A magnetic spectrometer was developed to determine the time-resolved spectral yields of primary electrons generated by pulsed plasma radiation; the total yields were measured using X-ray diodes. To determine the yields of primary and secondary electrons generated by steady-state monochromatic X-rays, a retarding potential method was used. The spectral yields generated by monochromatic radiation were also determined using a magnetic spectrometer. Emitter materials included the following conductors and dielectrics: aluminum, anodized aluminum, gold, silver, copper, glass, silicon, graphite, Mylar, Kapton, Teflon, solar-cell cover glass and white thermal paint. Those materials studied using both the pulsed and steady-state radiation exhibited good agreement primary yields. Each primary-electron energy spectrum was consistent with atomic absorption edges in the material. (Author)

21. PROPULSION AND FUELS

21B. Combustion and Ignition

AD-A094 820/8 PC **E19**/MF **E19**
Johns Hopkins Univ., Laurel, MD. Chemical Propulsion Information Agency.
JANNAF Combustion Meeting (17th) Held at Hampton, Virginia, 22-26 September 1980. Volume I,
Debra Sue Eggleston. Nov 80, 692p Rept no. CPIA-PUB-329-VOL-1
Contract N00024-78-C-5384
See also Volume 2, AD-A094 821.
Availability: Chemical Propulsion Information Agency, Johns Hopkins Road, Laurel, MD 20810 (No copies furnished by DTIC).

This volume, the first of four volumes, contains the unclassified/unlimited papers on combustion in solid rocket motors and on combustion in ramjets. Subjects discussed include metal burning, steady-state combustion of composite propellants, velocity coupling and nonlinear instability, vortex shedding and flow effects on combustion instability, combustion instability in solid rocket motors, combustion diagnostics, subsonic and supersonic ramjet combustion, characterization of ramburner flow fields, and injection, ignition, and combustion of ramjet fuels. The volume contains subject, personal author, and corporate source indexes. (Author)

AD-A094 896/8 PC **A03**/MF **A01**
Naval Research Lab., Washington, DC.
Detailed Modelling of Combustion: A Non-Interfering Diagnostic Tool.
Memorandum rept.,
E. S. Oran, J. P. Boris, and M. J. Fritts. 19 Jan 81, 48p Rept no. NRL-MR-4427

A major goal of detailed numerical modelling of combustion is to develop computational tools which can be used interactively with laboratory diagnostic techniques to interpret and understand experiments. Only through this quantitative interaction of prediction and measurement can we calibrate convincingly our understanding of the fundamental physical and chemical processes involved. Modelling of flames and detonations is particularly challenging because of the strong feedback between the energy released due to chemical reactions and the evolution of the hydrodynamic flow. Since it is generally not possible to decouple these processes completely, special numerical techniques are required to solve the problems. In this paper, the basic steps and decisions which must be made when constructing and using a numerical model will be discussed. These involve choosing the numerical algorithms based on the physics and chemistry of the problem, testing the model based on these algorithms in different limits against theoretical and analytical results, and using the model interactively with experiments. With the third step specifically in mind, it will be shown how the species concentration, velocity, and temperature profiles obtained from laser probe diagnostics can provide information for use in and comparison with detailed calculations. (Author)

AD-A094 918/0 PC **A02**/MF **A01**
SRI International, Menlo Park, CA.
Catalytic Combustion in a Stagnation Point Boundary Layer.
C. M. Ablow, S. Schechter, and H. Wise. 19 Oct 79, 13p AFOSR-TR-81-0032
Contract F49620-77-C-0123
Pub. in Combustion Science and Technology, v22 p107-117 1980.

No abstract available.

ANL/CEN/FE-80-7 PC **A03**/MF **A01**
Argonne National Lab., IL.
Exploratory and Basic Fluidized-Bed Combustion Studies. Quarterly Report, October-December 1979.
I. Johnson, K. M. Myles, and W. M. Swift. Nov 80, 46p
Contract W-31-109-ENG-38

These laboratory- and process-development-scale studies support the Fossil Energy development program for atmospheric and pressurized fluidized-bed combustion. The objective of the current program is to investigate methods for improving the utilization of limestone for SO sub 2 emission control in FBCs and to develop a method for predicting the performance in AFBC's and PFBC's of limestones from different sources. This report presents results from (1) an investigation of the use of water treatment of spent partially sulfated limestone to enhance its SO sub 2 capture capacity, (2) studies of the kinetics of the hydration of spent limestone, and (3) studies of the attrition and elutriation of limestones in fluidized beds. Results of studies of the particle-removal efficiency of the TAN-JET cyclone are also reported. (ERA citation 06:006910)

DOE/ET/13011-12 PC **A02**/MF **A01**
Management and Technical Services Co., Philadelphia, PA.
Operation and Maintenance of DOE/PETC 700 H.P. Combustion Test Facility 100-20 H.P. Firetube Boiler Test Facility Contract No. De-AC02-78ET13011. Quarterly Activity Report, Jun 30, 1980-Sep 29, 1980: Third Quarter.
1980, 12p
Contract AC02-78ET13011

Successful testing activities were completed on all boiler installations during the reporting period. The major portion of the activity centered around preparation and operation of the 100 H.P. boiler for testing with SRC fuels. Six days of successful operation were completed on No. 6 fuel oil, SRC slurry and melted SRC I. Two successful test runs on 40% COM with Illinois coal were completed on the 700 H.P. unit and four successful runs with SRC II and No. 2 fuel oil were completed on the 20 H.P. boiler. (ERA citation 06:006912)

DOE/QQ/90430-T1 PC **A03**/MF **A01**
MITRE Corp., McLean, VA. METREK Div.
Solid Fuel Combustion Technology for the Stirling Engine.
R. Roberts. 1977, 42p
Contract AC01-77QQ90430

The current status of fluidized bed combustion has been reviewed with emphasis on its potential application to industrial power or heating plants and to alternative fuels. This technology is ready for commercialization and there is strong evidence of its high adaptability to a large variety of fuels, including biomass and industrial wastes. Coal-oil slurry combustion also is being developed and has been demonstrated in small industrial boilers. The combustion tests to date indicate a need for improved fuel stability, fuel feed control and atomizer design. There is a tendency for the ash from the combustion process to accumulate on the boiler tubes or flow stagnation regions. The ash deposited was readily removed. In the tests conducted, the burning of coal-oil mixtures led to a 1 to 2 percent derating of the boilers. Longer life tests than those reported to date are required to determine ash build up, the frequency of boiler tube cleaning, and the corrosion of boiler tubes. The ash content in the combustion products may make direct heat transfer to the Stirling engine impractical. This is due to the high probability of ash deposition on the heat exchanger for the high temperature (expander side) of the engine with a marked decrease in heat transfer rate. In this case it would become necessary to add a heat exchanger between the combustor and the hot side of the engine. This could be a heat pipe, pressurized gas or other appropriate method. However, this leads to lower heat exchange rates to the heater head increasing its size and decreasing Stirling engine efficiency due to increased dead space. It also will add to system initial and maintenance costs. (ERA citation 06:008075)

SAND-79-8236 PC **A06**/MF **A01**
Sandia Labs., Livermore, CA.
Theoretical Model of Chemically Reacting Recirculating Flows.
R. E. Mitchell. Apr 80, 105p
Contract EY-76-C-04-0789

A theoretical model designed to calculate the aerodynamic, thermal and concentration distributions established in a confined, axisymmetric laminar diffusion flame is described. The computer program developed can be used to examine a wide variety of laminar flow situations ranging from the isothermal flow of a single fluid through a pipe to the flow of a reactive gas jet issuing into a coflowing gas stream. Allowances can be made for natural convection effects, variable thermodynamic and transport properties and detailed finite-rate chemistry. An iterative procedure is employed to find the solution to the set of finite-difference equations which are representative of the mass, momentum and energy conservation laws. The procedure advances each dependent variable field from one iteration to the next by successively treating chemical, and radial and axial convective and diffusive contributions to the conservation equations implicitly. The procedure is stable and results in an accurate steady-state solution. The governing elliptic differential equations, the boundary conditions and te expressions for the thermodynamic and transport properties of the gas mixture are presented. The finite-difference and solution procedures are described and test problems used to validate the theoretical model are discussed. (ERA citation 05:022815)

SAND-80-8246 PC **A03**/MF **A01**
Sandia National Labs., Livermore, CA.
Fundamental Combustion and Diagnostics Research at Sandia.
D. L. Hartley, and M. A. Gusinow. Dec 80, 38p
Contract AC04-76DP00789

The combustion research emphasizes basic research into fundamental problems associated with combustion. The program addresses: (1) detailed chemistry of combustion, (2) fundamental processes associated with laminar and turbulent flames, (3) development of research techniques specifically applicable to combustion environments, and (4) operation of the user-oriented Combustion Research Facility. The first section of this report contains activities in Combustion Research, the second section contains activities in Molecular Physics and Spectroscopy, and the third section contains activities in Diagnostics Research. (ERA citation 06:008045)

21C. Electric Propulsion

AD-A094 884/4 PC **A06**/MF **A01**
TRW Defense and Space Systems Group, Redondo Beach, CA.
Pulsed Inductive Thruster Development (Advanced Electric Propulsion Technology - High Thrust).
Final technical rept. Oct 79-Nov 80,
C. L. Dailey, and R. H. Lovberg. Jan 81, 110p
AFRPL-TR-80-67
Contract F04611-79-C-0058

This report describes the results of an experimental investigation of the operation and efficiency of a large impulsive plasma thruster. The thruster uses a one-meter diameter flat spiral coil through which current is pulsed by discharging a 4000 Joule capacitor bank using a spark gap switch. The plasma is driven through inductive coupling rather than with electrodes so as to avoid erosion and energy loss mechanisms that might be undesirable for spacecraft uses. The object of the work was to compare thruster efficiency with pulsed gas injection to the 'static fill' efficiency of a similar one-meter, diameter, coil thruster tested earlier. Using only the first half-cycle impulse, the 'static fill' efficiency had been 38% at 1730 seconds Isp. Using the impulse of three half-cycles for the present pulsed injection test (0.190, 0.033 and 0.011

Newton-seconds) the measured thrust efficiency was 45% at 1570 seconds Isp. (Author)

PB81-859340 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Plasma Engines. January, 1970-December, 1980 (Citations from the NTIS Data Base).
Rept. for Jan 70-Dec 80.
Feb 81, 113p NERACUSGNT2541

The citations in this bibliography cover plume characterization of pulsed plasma thrustors, experimental and theoretical analysis of plasma exhaust, plasma igniters for internal combustion engines, plasma engineering studies for experimental power reactors, design and applications of magnetoplasmadynamic (MPD) propulsion system. The dynamics and characteristics of plasma engines are also included in this bibliography. (Contains 109 citations, fully indexed and including a table of contents.)

21D. Fuels

AD-A095 057/6 PC **A09**/MF **A01**
General Electric Co., Cincinnati, OH. Aircraft Engine Group.
Evaluation of Fuel Character Effects on J79 Smokeless Combustor.
Final technical rept. 1 Jul 79-1 Jun 80,
C. C. Gleason, T. L. Oller, M. W. Shayeson, and M. J. Kenworthy. Nov 80, 194p R80AEG618, AFWAL-TR-80-2092, AFESC/ESL-TR-80-46
Contract F33615-79-C-2033

Results of a program to determine the effects of broad variations in fuel properties on the performance, emissions, and durability of the J79-17C turbojet engine combustion system are presented. Thirteen different fuels were tested, covering a range of hydrogen contents, aromatic types, boiling ranges, and viscosities. At high power operating conditions, fuel hydrogen content was found to be a very significant fuel property with respect to linear temperature, flame radiation, smoke, and NOx emission levels. At idle and cruise operating conditions, CO and HC emission levels were found to be dependent on both fuel hydrogen content and relative spray droplet size. At cold day ground start conditions lightoff correlated with the relative fuel droplet size. Altitude relight limits at low flight Mach numbers were fuel dependent and also correlated with the relative fuel droplet size. Combustor liner life analyses, based on the test data, yielded relative life predictions of 1.00, 0.93, 0.83, and 0.73 for fuel hydrogen contents of 14.5, 14.0, 13.0, and 12.0 percent, respectively. High temperature cyclic fuel nozzle fouling tests revealed significant effects of fuel quality and operating temperature on nozzle life. The results correlated with laboratory thermal stability ratings of the fuels. (Author)

ANL/MSD/FE-80-5 PC **A02**/MF **A01**
Argonne National Lab., IL.
Analysis of Failed Thermocouple Assemblies from the IGT HYGAS Coal-Gasification Pilot Plant.
J. Y. N. Wang, and D. R. Diercks. Nov 80, 20p
Contract W-31-109-ENG-38

Several Chromel-Alumel thermocouple assemblies from the IGT HYGAS Pilot Plant failed after about 316 hours of service in the steam-oxygen gasifier (SOG) section of the plant. The failures consisted of the rupture of the Type 310 stainless steel sheath material along considerable portions of its length and the corrosive attack of the sheath inner surface, thermocouple wires, and MgO insulating material. Failure occurred due to the penetration of the SOG environment to the interior of the thermocouple assembly through preexisting flaws in the sheath. The limited oxygen supply present at the inner surface of the sheath prevented the formation of a protective oxide over this surface, and significant sulfidation occurred. Water vapor present in the SOG environment caused the MgO insulation to transform to Mg(OH) sub 2 , and the volume expansion associated with this transformation caused the sheath, which had already been embrittled at the inner surface due to sulfidation, to rupture. (ERA citation 06:006837)

CEA-CONF-4804 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Program of the GEGN (Study Group for the Gasification of Coal by Nuclear Heat).
J. Pottier, J. Malherbe, and P. Chiche. 1979, 24p CONF-7909158-1
In French.Congress of the Gas Technical Association, Aix-les-Bains, France, 18 Sep 1979.
U.S. Sales Only.

Gaz de France has investigated the possibilities of producing a gas from coal and nuclear energy, to make up a natural gas supply by the end of the century and onwards. With this in view the GEGN (study group for the gasification of coal by nuclear heat) has been set up by gas de France, the Commissariat a l'Energie Atomique, Charbonnages de France, Creusot-Loire and Novatome. Its work is described here. The general principles of coal gasification are reviewed and the main options of the project adopted by the GEGN are discussed. This project covers two complementary fields which are examined in turn: nuclear steam reforming of methane, using a high-temperature nuclear reactor (study carried out by the CEA) and hydrogenation of liquefied coal, studied on a CHERCHAR trial bench and the conversion of the products obtained into gaseous products. (Atomindex citation 11:532293)

CONF-801030-3 PC **A02**/MF **A01**
Department of Energy, Bartlesville, OK. Bartlesville Energy Technology Center.
Comparisons of Gasohol and Gasoline in Laboratory and Field Trials.
J. R. Allsup, and M. D. Gurney. 18 Dec 80, 7p
International symposium on alcohol fuels technology, Sao Paulo, Brazil, 5 Oct 1980.

Experimental work has been done to obtain comparative field experience with gasohol and with gasoline used in controlled tests with units of a commercial service fleet. A total of 110 vehicles were involved with half of the units operated using a control gasoline and the other half operated using gasohol. At an appropriate point in the tests, fuels were switched so that both gasohol- and gasoline-related data were obtained from all individual test units. Southwestern Bell Telephone vehicle operators observed and recorded information from the vehicles during use in normal field service. Vehicle drivers rated driveability and recorded the nature and circumstances of vehicle malfunction. Service records provided information on fuel economy and on fuel system problems. Emissions and fuel economy data were obtained from tests conducted on the vehicles at the Bartlesville Energy Technology Center using a chassis dynamometer to run EPA's prescribed test routines. Results in comparing experience between using gasohol and using gasoline showed, on the average, regulated emissions to have been lower for vehicles fueled with gasohol. However, considering individual vehicles, results were mixed, and the data are inadequate to conclude that real differences attributable to the test fuels exist. Fuel economy at rated vehicle weight was found unchanged between fuels, while driveability was somewhat poorer using gasohol. In brief, in the perspective of normal performance and problems to be expected, no substantial difference was observed in field or laboratory experience in the comparative testing of gasohol and control gasoline. (ERA citation 06:007895)

DOE/AF-0001 MF **A01**
Department of Energy, Washington, DC. Office of Alcohol Fuels.
Internal Combustion Engines for Alcohol Motor Fuels: A Compilation of Background Technical Information.
Nov 80, 362p
Available in microfiche only.

This compilation, a draft training manual containing technical background information on internal combustion engines and alcohol motor fuel technologies, is presented in 3 parts. The first is a compilation of facts from the state of the art on internal combustion engine fuels and their characteristics and requisites and provides an overview of fuel sources, fuels technology and future projections for availability and alternatives. Part two compiles facts about alcohol chemistry, alcohol identification, production, and use, examines ethanol as spirit and as fuel, and provides an overview of modern evaluation of alcohols as motor fuels and of the characteristics of alcohol fuels. The final section compiles cross references on the handling and combustion of fuels for I.C. engines, presents basic evaluations of events leading to the use of alcohols as motor fuels, reviews current applications of alcohols as motor fuels, describes the formulation of alcohol fuels for engines and engine and fuel handling hardware modifications for using alcohol fuels, and introduces the multifuel engines concept. (ERA citation 06:007957)

DOE/BETC/PPS-80/4 PC **A03**/MF **A01**
Department of Energy, Bartlesville, OK. Bartlesville Energy Technology Center.
Heating Oils, 1980.
E. M. Shelton. Oct 80, 44p

Properties of 247 heating oils marketed in the United States were submitted for study and compilation under agreement between the Bartlesville Energy Technology Center and the American Petroleum Institute. The fuels were manufactured by 26 petroleum refining companies in 87 domestic refineries. The data are tabulated according to six grades of fuel and subdivided into five geographic regions in which the fuels are marketed. The six grades of fuel are defined by the American Society for Testing and Materials Specification D396. The five regions containing a total of 16 marketing districts are shown on a map in the report. Trend charts are included showing average properties of the six grades of fuel for the past several years. Summaries of the results of the tests by grade and by region for 1980 compared with data for 1979 are shown in tables. Analyses of grades 2, 5(light), and 6 foreign import oils are presented. (ERA citation 06:006941)

DOE/CS/40273-1 PC **A03**/MF **A01**
Procedyne Corp., New Brunswick, N.J.
Engineering Modifications to Existing Waste Atactic Polypropylene to Fuel Conversion Plant, Novamont Corp., LaPorte, Texas.
A. Amato. 1 Oct 80, 34p
Contract AC02-79CS40273

Procedyne Corp. demonstrated a process for the conversion of waste atactic polypropylene to fuel oil on Contract No. EC-77-C-01-5077 dated 9/12/77. The demonstration program was successful and resulted in construction of the first commercial scale Waste Atactic to Fuel Conversion plant at the Novamont Corp. polypropylene producing plant in Texas. The design capacity of the plant is 17,000,000 lbs per year of waste atactic polypropylene converted to 2,300,000 gallons per year of fuel oil. The commercial plant has been in startup operation since early 1980. The conversion process has been successfully operated; however, there are four areas which are giving difficulties and preventing stable long-term operation. The report is accompanied by a quotation for the necessary modifications for the plant to meet design basis operation. The price of this work is $282,729. Delivery of all items will be before March 30, 1981. It is anticipated that the proposed modifications will eliminate current operating difficulties. The success of the commercial operation on the Novamont Corp. plant, LaPorte, Texas, is fundamentally important to the success of the total waste atactic to fuel conversion program and to the waste plastic to fuel conversion program. (ERA citation 06:007092)

DOE/EIA-0117/78 PC **A02**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Energy Data Report: World Crude Oil Production Annual 1978.
12 Jun 79, 3p

World crude oil production in 1978 totaled 22,158 million barrels, an increase of 258 million barrels above the 1977 level. Western Hemisphere production amounted to 5,396 million barrels, compared with 5,139 million barrels in 1977. The 257-million-barrel increase is attributed principally to the United States' North Slope of Alaska, Mexico, Argentina, Ecuador and Peru. Eastern Hemisphere crude oil production increased slightly, by 590,000 barrels. Largest decreases were in the Middle East

and Africa; however, Norway, United Kingdom, Brunei, Malaysia, People's Republic of China and the USSR reported increases in production. Countries that produced more than a billion barrels of crude oil in 1978 ranked as follows: USSR, United States, Saudi Arabia, and Iran. All 1978 figures in this table are preliminary and subject to change. (ERA citation 05:033265)

DOE/ER/05006-T1 PC **A02**/MF **A01**
Utah Univ., Salt Lake City.
NMR Analysis of Coal Macerals. Progress Report.
R. J. Pugmire. 13p
Contract AS02-78ER05006

A second set of six vitrinite samples were hand picked from the lower Kittanning Seam and obtained from Penn State University. The rank of the samples ranged from low volatile to high volatile B bituminous. The ultimate and proximate analyses are given in Table 1. This set of samples was selected in order to assess the nature of structural changes observed when carefully selected coal samples from a given seam are examined using CP/MAS techniques. In each case, the samples contained greater than 95% vitrinite. For purposes of clarity, the CP/MAS spectrum of PSMC-67 is given in Figure 1 as a composite of exp 13 C chemical shifts of structural units containing H, C, and O. The vitrinite spectra thus displays the range of chemical structural types that give rise to resonance lines in different spectral regions. The banded structure observed provides enough detail to discuss major structural types present. A casual observation demonstrates that a significant amount of aliphatic oxygen is present (50 to 95 ppM region). Further interpretative details are given and also the changes in the spectra with rank progression are discussed. (ERA citation 06:006882)

DOE/ET/27230-T2 PC **A13**/MF **A01**
CH2M/Hill, Boise, ID.
Utilization of Geothermal Energy for Methane Production for J.A. Albertson Land and Cattle Company. Final Report.
Jul 80, 279p
Contract AC51-79ET27230

The feasibility of an integrated system to utilize a geothermal resource for a bioconversion plant. This integrated facility would use the manure from approximately 30,000 head of feedlot cattle as a feedstock for an anaerobic digestion plant. The findings on engineering design, geological assessment, environmental, economic, and institutional requirements of the proposed project are summarized. (ERA citation 06:007643)

DOE/PC/30013-2 PC **A05**/MF **A01**
Pennsylvania State Univ., University Park. Coal Research Section.
Data Base for the Analysis of Compositional Characteristics of Coal Seams and Macerals. Quarterly Technical Progress Report, May-July 1980.
A. Davis, N. H. Suhr, W. Spackman, P. C. Painter, and P. L. Walker. Oct 80, 85p
Contract AC22-80PC30013

The basic objectives of this new program are, firstly, to understand the systematic relationships between the properties of coals and macerals, and, secondly, to determine the lateral and vertical variability in the properties of a single seam imposed by varying environmental conditions at the time of coal formation. Thirty-four coal samples were collected during the quarter from Pennsylvania and Illinois. To date, 54 vitrinite concentrates have been hand picked and will be studied by a range of physical and chemical techniques. One hundred and forty coal samples and 53 printouts of coal data were provided on request to the coal research community. The Lower Kittanning seam has been selected for the study of the variability in chemical, petrographic, mineralogic, fluid, and conversion properties of a single seam. A description of the structural and stratigraphic settings of the important coal seam as they relate to this investigation is given. Bivariate plots of data from the Lower Kittanning seam are presented. The fluid temperature range as measured with the Gieseler plastometer reaches a maximum at a reflectance of 1.10 to 1.15% and carbon content of 87 to 88% dmmf. Liquefaction conversion in a tubing-bomb reactor with tetralin shows a linear decrease with rank (reflectance). The problems associated with the application Fourier Transform Infrared Spectroscopy to the characterization of coal structure are critically discussed. The micropore surface areas and micropore volumes of three selected coals and a vitrinite concentrate, as measured from uptake of CO sub 2 at 25 exp 0 C, increased with decreasing particle size. Work on measurements of apparent densities and uptake of methanol and water is in progress. (ERA citation 06:006895)

DOE/RA-T0002 PC **A12**/MF **A01**
Department of Energy, New Orleans, LA. Strategic Petroleum Reserve Project Management Office.
Program Stewardship Report. No. 2. SPR Status and Issues.
25 Jan 79, 252p

Stewardship Report number 2, Technical/Engineering, dated January 25, 1979, is a companion document to Stewardship Report number 1, Managerial, dated November 3, 1978. These two documents coupled together provide the foundation to the current Strategic Petroleum Reserve (SPR) Baseline. The SPR system now possesses the capability of averaging approximately 10.5 MMB monthly of crude oil fill. This is consistent with the Stewardship number 1 Baseline of 244 MMB in storage and 4 MMB in tanks/pipelines by June 1980 (248 MMB). Consistent with Stewardship number 1, permanent drawdown capability for the current three sites having oil storage is projected for the September 1979 time frame. Should national exigencies require, emergency/contingency drawdown at 200,000 barrels per day within 45 days can be achieved after approval of certain sole source procurements and selected environmental and permit waivers. Current oil market conditions now affect SPR oil deliveries under contract and projected procurements. This situation now paces and may revise the oil fill schedules. As of this date, no actions are underway to divert current deliveries nor defer actions to procure. SPR performance and progress are specifically measurable from this managerial and technical/engineering baseline in achieving this urgent national program. (ERA citation 06:006947)

EPRI-AP-1623(V.1) PC **A04**/MF **A01**
Westinghouse Electric Corp., Concordville, PA. Combustion Turbine Systems Div.
Gas Turbine Combustor Performance on Synthetic Fuels. Final Report.
S. M. DeCorso, P. W. Pillsbury, G. Bauserman, P. R. Mulik, and T. R. Stein. Nov 80, 66p

The purpose of Project RP989-1 was to determine the effects of burning coal- and shale-derived synthetic liquid fuels in state-of-the-art gas turbine combustors. Ten types of coal-derived liquid fuels from the SRC-I, SRC-II, EDS, and H-Coal processes, and three hydrogenated shale oil fuels were utilized. The combustion and emission performance of fuels other than petroleum has now been obtained. The main conclusion was that synthetic fuels burned approximately as expected from extrapolation of the combustion results obtained with petroleum fuels. Synthetic fuels with hydrogen content greater than approximately 10% (by weight) and nitrogen content less than approximately 0.2% should be satisfactory for engines of current design. These include a number of the fuels tested. A wider selection of synthetic fuels could be used in engines of a lower pressure ratio and/or turbine inlet temperature. Conversely, designs of higher turbine inlet temperature and/or pressure ratio would require tighter fuel specifications or the development of improved combustor cooling, smoke performance, and NO/sub x/ suppression. The other combustion characteristics of the synthetic fuels were quite satisfactory. They burned smoothly, cleanly, efficiently, and ignited readily with no significant coking. All fuels were handled acceptably by standard fuel forwarding systems. Emissions of CO, UHC and particulates were at about the same low levels as for petroleum distillate No. 2. Analysis and correlation of NO/sub x/ emissions and wall temperatures versus fuel properties have been developed for prediction of these effects over a range of operating conditions. Volume I summarizes the main conclusions and the results of these correlations of the data. Volume II presents the detailed test and analysis results. (ERA citation 06:007693)

FE-6010-21 PC **A03**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Materials Research for the Clean Utilization of Coal. Quarterly Progress Report, July-September 1979.
1979, 50p
Contract EA-77-A-01-6010-002

US Bureau of Standards work in support of coal gasification, liquefaction and other conversion processes is presented. This involves metal corrosion, ceramic deformation fracture and erosion, measurements of the viscosity of slags over a temperature range, measurement of the vapor transport of alkali metal compounds from slags of high temperature, recording and analysis of failures at coal conversion plants, measurements of creep of MHD refractories at high temperature, and corrosion of downstream MHD components. (ERA citation 06:007963)

INIS-mf-5765 PC **A02**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.).
Hydrogen and Oxygen Production with Nuclear Heat.
H. Barnert. Sep 79, 23p
In German.Meeting on high temperature reactors, Essen, Germany, F.R. 25 - 26 Oct 1979.
U.S. Sales Only.

After some remarks on the necessity of producing secondary energy sources for the heat market, the thermodynamic fundamentals of the processes for producing hydrogen and oxygen from water on the basis of nuclear thermal energy are briefly explained. These processes are summarized as one class of the 'thermochemical cycle process' for the conversion of thermal into chemical energy. A number of thermochemical cycle processes are described. The results of the design work so far are illustrated by the example of the 'sulphuric acid hybrid process'. The nuclear heat source of the thermochemical cycle process is the high-temperature reactor. Statements concerning rentability are briefly commented upon, and the research and development efforts and expenditure required are sketched. (orig.) 891 GG/orig. 892 MB. (Atomindex citation 11:532057)

ORNL/TM-7610 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
Fossil Energy Program. Progress Report for October 1980.
Jan 81, 123p
Contract W-7405-ENG-26

This report - the seventy-fifth of a series - is a compendium of monthly progress reports for the ORNL research and development program that are in support of the increased utilization of coal and other fossil fuel alternatives as sources of clean energy. The projects reported this month include those for coal conversion development, chemical research and development, materials technology, component development and process evaluation studies, technical support to major liquefaction projects, process analysis and engineering evaluations, fossil energy environmental analysis, flue gas desulfurization, solid waste disposal, coal preparation waste utilization, plant control development, atmospheric fluidized bed coal combustor for co-generation, TVA FBC demonstration plant program technical support, PFBC systems analysis, fossil fuel application assessments, performance assurance system support for fossil energy projects, and international energy technology assessment. (ERA citation 06:006814)

ORNL-5702 PC **A15**/MF **A01**
Oak Ridge National Lab., TN.
Fossil Energy Program. Quarterly Progress Report for Period Ending September 30, 1980.
Jan 81, 348p
Contract W-7405-ENG-26

This quarterly report covers the progress made during the period July 1 through September 30 for the Oak Ridge National Laboratory research and development projects that are carried out in sup-

port of the increased utilization of coal and other fossil fuels as sources of clean energy. These projects are supported by various parts of DOE including Fossil Energy, Basic Energy Sciences, Office of Health and Environmental Research, Office of Environmental Compliance and Overview, Economic Regulatory Administration, Policy and Evaluation, Resource Applications, by the Electric Power Research Institute, and by the Tennessee Valley Authority and the EPA Office of Research and Development through interagency agreements with the DOE. (ERA citation 06:006813)

PB81-153876 PC **A03**/MF **A01**
National Alcohol Fuels Commission, Washington, DC.
Legislative Compendium: Alcohol Fuels (96th Congress).
14 Apr 80, 33p NAFC/80-11

A complete listing of all legislation introduced during the first 16 months of the 96th Congress on the subject of alcohol fuels and biomass energy. Including more than 120 bills, each entry includes: bill title, sponsor and certain co-sponsors, date of introduction, committee referred to, a listing of the major provisions, the Federal Agencies affected by the bill, and a brief history of Congressional action on the bill through April 14, 1980. All bills are cross referenced on subjects such as: financial assistance, research and development, Federal use of gasohol, tax incentives.

PB81-154619 PC **A09**/MF **A01**
Ocean Management Associates, Saunderstown, RI.
Marine Plant Biomass for Alcohol Fuels.
Francis X. Cameron, Henry S. Parker, J. M. Gates, and Kevin Klarnet. Mar 80, 195p NAFC-80-12

This report provides a basic evaluation of the potential of marine plants as an economical source of substitute fuels. The potential of different species and cultivation techniques for marine biomass production will be evaluated and compared. The analysis will consist of a review of the cultivation and harvesting technology, the production costs and the expected biomass yield. Legal and institutional constraints as well as environmental and socio-economic impacts will also be evaluated.

PNL-3650 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Study of Coal Structure Using Secondary Ion Mass Spectrometry.
G. L. Tingey, J. M. Lytle, D. R. Baer, and M. T. Thomas. Dec 80, 26p
Contract AC06-76RL01830

Secondary-ion Mass Spectrometry (SIMS) is examined as a tool for studying the chemical structure of coal. SIMS has potential for analysis of coal because of the following characteristics: sensitivity to chemical structure; high sensitivity to all masses; application to solids; excellent depth resolution; and reasonable spatial resolution. SIMS spectra of solid coals show differences with respect to coal rank, the spectra of high rank coal being similar to that of graphite, and the spectra of low rank coal being similar to that of wood. Some functional group analysis is also possible using SIMS. Low rank coals show a larger peak at 15 amu indicating more methyl groups than found in the higher rank coals. Fragments with two and three carbon atoms have also been examined; much larger fragments are undoubtedly present but were not evaluated in this study. Examination of these groups, which are expected to contain valuable information on coal structure, is planned for future work. It has been observed that mineral atoms present in the coal have large secondary ion yields which complicate the interpretation of the spectra. Studies on mineral-free coals and model compounds are therefore recommended to facilitate determination of organic coal structure. In addition, mass spectrometry with much greater mass resolution will aid in distinguishing between various ion species. (ERA citation 06:006874)

SERI/TR-352-554 PC **A04**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Agricultural Sector Impacts of Making Ethanol from Grain.
D. Hertzmark, D. Ray, and G. Parvin. Mar 80, 74p
Contract EG-77-C-01-4042

This report presents the results of a model of the effects on the agricultural sector of producing ethanol from corn in the United States between 1979 and 1983. The model is aggregated at the national level, and results are given for all of the major food and feed crops, ethanol joint products, farm income, government payment, and agricultural exports. A stochastic simulation was performed to ascertain the impacts of yield and demand variations on aggregate performance figures. Results indicate minimal impacts on the agricultural sector for production levels of less than 1 billion gallons of ethanol per year. For higher production levels, corn prices will rise sharply, the agricultural sector will be more vulnerable to variations in yields and demands, and joint-product values will fall. Possibilities for ameliorating such effects are discussed, and such concepts as net energy and the biomass refinery are explored. (ERA citation 05:023776)

21E. Jet and Gas Turbine Engines

AD-A094 730/9 PC **A07**/MF **A01**
General Electric Co., Cincinnati, OH. Aircraft Engine Group.
Backup Control for a Variable Cycle Engine.
Final technical rept. 1 Sep 77-16 Apr 79 on Phase 2,
Howard B. Kast. Jul 80, 130p R80AEG450, AFAPL-TR-79-2069
Contract F33615-76-C-2086
See also Rept. no. AFAPL-TR-77-92, AD-A055 658.

The next generation of variable cycle aircraft engines (VCE) will have an increased complexity associated with the number of controlled engine variables, inherent cycle variability, and inlet-engine-exhaust control integration. This level of engine complexity and the expanding integration of aircraft/engine controls causes a commensurate increase in the control system complexity and capacity. Digital electronics has been identified as the only viable means for meeting these significantly more sophisticated requirements of the future VCE. Although recent digital electronic advances promise new levels of reliability, this improvement is offset by the increased circuitry of the more complex control. Especially in the case of the single-engine aircraft, it is recognized that such variable cycle engines should be equipped with a Backup Control for emergency use. The recommended hydromechanical approach has been constructed, calibrated and evaluated in a test cell. These evaluations included transient operation and transfer form the primary control to the backup control and back to primary operation. Successful operation was achieved, providing test hardware which is intended for further validation through on-engine testing.

AD-A094 912/3 PC **A16**/MF **A01**
Advisory Group for Aerospace Research and Development, Neuilly-sur-Seine (France).
Centrifugal Compressors, Flow Phenomena and Performance.
Conference proceedings.
Nov 80, 353p Rept no. AGARD-CP-282
Presented at the Specialists' Meeting (55th) (B) of the Propulsion and Energetics Panel Held at Brussels (Belgium), 7-9 May 80.

These Conference Proceedings contain the 21 papers presented at the AGARD Propulsion and Energetic Panel 55th (b) Specialists' Meeting on Centrifugal Compressors, Flow Phenomena and Performance, which was held in Brussels, Belgium, on 7-9 May 1980. The questions and answers after the presentation of each paper, as well as after the evaluation which was made at the end of the meeting, are included. (Author)

AD-A095 080/8 PC **A07**/MF **A01**
Pennsylvania State Univ., State College. Applied Research Lab.
Coupling of Unsteady Lift to Acoustic Duct Modes in an Axial Flow Fan.
Technical memo.,
C. S. Lee. 15 Sep 80, 135p Rept no. ARL/PSU/TM-80-188
Contract N00024-79-C-6043

By using distortion screens, plane (0,0) and spinning (-1,0) acoustic modes were generated in an axial flow research fan. The unsteady lift on the rotor blade and the acoustic pressure along the duct were measured simultaneously by a lift gage sensor and a flush-mounted microphone respectively. The screens were calibrated by circumferentially traversing a five-hole probe. The typical background noise of unsteady lift and acoustic pressure was well below the desired signals. A phase-locked ensemble averaging technique was used to obtain the amplitude and phase of the periodic unsteady signals. The measured acoustic pressures were decomposed into modal pressures and compared with theoretical prediction; a reasonable trend was reached, but the discrepancies were large. The unsteady lift measurements of (-1,0) mode generation agreed with predictions except near the cutoff frequency indicating a back-reaction effect of considerable magnitude. The predictions overestimated the unsteady lift for the condition of 'aerodynamic resonance' when the plane wave was generated. (Author)

AD-A095 144/2 PC **A09**/MF **A01**
Avco Lycoming Div., Stratford, CT.
Regenerative Engine Analysis Program.
Final study rept. Oct 79-Jul 80,
P. Schwaar, J. Dale, and J. Banks. Jan 81, 199p LYC-80-73, USAAVRADCOM-TR-80-d-29
Contract DAAK51-79-C-0056

A parametric cycle analysis and a preliminary recuperator design study were conducted for a 500-hp intermediate rated power (IRP) recuperative helicopter engine. The U-tube recuperator with airflow inside the tubes and single cross flow gas path was found to be the lightest design in the .6 - .8 effectiveness range considered for the cycle analysis. (Author)

DOE/RL/01830-T4 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Combustion Zone Durability Program-B. Task VIII. Sputter Deposited Ceramic and Metallic Coatings. Executive Summary.
J. W. Patten, R. W. Moss, and D. D. Hays. Nov 80, 38p
Contract AC06-76RL01830

The graded metal coatings are of the CoCrAlY type modified by including high Cr surface compositions, gradients in Cr and Al composition, underlayers and graded Pt additions, and Hf substitutions for Y. The metal ceramic layered coatings consist of alternate metal (Ni, Ni-Cr, CoCrAlY or Pt) and ceramic (Al sub 2 O sub 3 or ZrO sub 2 + Y) layers. Investigations of dense surface ceramic coatings are directed towards methods for obtaining adherent impermeable ceramic protective coatings for gas turbine hot section components. Increased coating adherence is being sought through two coating designs intended to accomodate expansion and modulus mismatches at the coating-substrate interface. (ERA citation 06:007962)

N81-15976/6 PC **A06**/MF **A01**
National Aeronautics and Space Administration, Hampton, VA. Langley Research Center.
Effects of Sidewall Geometry on the Installed Performance of Nonaxisymmetric Convergent-Divergent Exhaust Nozzles.
J. A. Yetter, and L. D. Leavitt. Dec 80, 119p NASA-TP-1771, L-13826

The investigation was conducted at static conditions and over a Mach number range from 0.6 to 1.2. Angle of attack was held constant at 0 deg. High pressure air was used to simulate jet exhaust flow at ratios of jet total pressure to free-stream static pressure from 1 (jet off) to approximately 10. Sidewall cutback appears to be a viable way of reducing nozzle weight and cooling requirements without compromising installed performance.

N81-16050/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.

Cold-Air Investigation of First Stage of 4-1/2-Stage, Fan Drive Turbine with Average Stage-Loading Factor of 4.66.
W. J. Whitney, T. P. Moffitt, and F. P. Behning. Jan 81, 15p NASA-TP-1780, E-461

The design procedure and the development of the blading geometry for the 4 and 1/2 stage turbine are discussed. Results obtained with the first stage, operated as a single stage turbine, are presented. A free vortex design meets the design requirements without incurring problems such as excessive turning, negative reaction, or high Mach number. Cold air tests of the single stage turbine showed that the turbine developed design work (stage loading factor of 5.26) at an efficiency of 0.86, which was the efficiency predicted by a reference method. The mass flow at this condition was 0.88, which occurred at design speed and a pressure ratio of 1.407, corresponding to a stage loading factor of 4.35. The efficiency at this condition was 0.003 higher than that predicted by the reference method.

N81-16051/7 PC **A09**/MF **A01**
General Electric Co., Cincinnati, OH. Aircraft Engine Group.
Core Compressor Exit Stage Study. Volume 2: Data and Performance Report for the Baseline Configuration.
D. C. Wisler. Nov 80, 178p NASA-CR-159498, R80AEG312-V-2
Contract NAS3-20070

The objective of the program is to develop rear stage blading designs that have lower losses in their endwall boundary layer regions. The overall technical approach in this efficiency improvement program utilized General Electric's Low Speed Research Compressor as the principal investigative tool. Tests were conducted in two ways: using four identical stages of blading so that test data would be obtained in a true multistage environment and using a single stage of blading so that comparison with the multistage test results could be made.

N81-16053/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Mean Rotor Wake Characteristics of an Aerodynamically Loaded 0.5 M Diameter Fan.
L. M. Shaw, and F. W. Glaser. 1981, 18p NASA-TM-81657, E-674
Presented at 19TH Aerospace Sci. Meeting, St. Louis, 12-15 Jan. 1981; Sponsored by Aiaa.

Mean rotor wake properties at several downstream distances behind the rotor of a loaded 1.2 pressure ratio fan were measured with a cross film anemometer in an anechoic wind tunnel. Mean wake characteristics in the midspan and near tip region were determined utilizing an ensemble averaging technique. The upwash and streamwise components of the velocity behind the rotor indicate a complex structure superimposed on the major velocity defects at a down stream spacing of 0.5 rotor chords. Spectral analysis indicates high levels of the second and fourth harmonics of the blade passage frequency in the midspan region while the blade passage frequency and its second and third harmonic are predominant in the tip region.

N81-16055/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Propulsion System Mathematical Model for a Lift/Cruise Fan V/STOL Aircraft.
G. L. Cole, J. F. Sellers, and B. E. Tinling. Dec 80, 48p NASA-TM-81663, E-681

A propulsion system mathematical model is documented that allows calculation of internal engine parameters during transient operation. A non-real-time digital computer simulation of the model is presented. It is used to investigate thrust response and modulation requirements as well as the impact of duty cycle on engine life and design criteria. Comparison of simulation results with steady-state cycle deck calculations showed good agreement. The model was developed for a specific 3-fan subsonic V/STOL aircraft application, but it can be adapted for use with any similar lift/cruise V/STOL configuration.

N81-16056/6 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Two-Stage Combustion for Reducing Pollutant Emissions from Gas Turbine Combustors.
R. M. Clayton, and D. H. Lewis. 1 Feb 81, 86p NASA-CR-163877, JPL-PUB-80-63
Contract NAS7-100

Combustion and emission results are presented for a premix combustor fueled with admixtures of JP5 with neat H2 and of JP5 with simulated partial-oxidation product gas. The combustor was operated with inlet-air state conditions typical of cruise power for high performance aviation engines. Ultralow NOx, CO and HC emissions and extended lean burning limits were achieved simultaneously. Laboratory scale studies of the non-catalyzed rich-burning characteristics of several paraffin-series hydrocarbon fuels and of JP5 showed sooting limits at equivalence ratios of about 2.0 and that in order to achieve very rich sootless burning it is necessary to premix the reactants thoroughly and to use high levels of air preheat. The application of two-stage combustion for the reduction of fuel NOx was reviewed. An experimental combustor designed and constructed for two-stage combustion experiments is described.

N81-16421/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
The Effect of Inflow Velocity Profiles on the Performance of Supersonic Ejector Nozzles.
A. R. Bishop. 1981, 8p NASA-TM-81673, E-697
Presented at the 19TH Aerospace Sci. Meeting, St. Louis, 12-15 Jan. 1981; Sponsored by Aiaa.

The effect of initial velocity profile on the performance of axisymmetric supersonic ejector nozzles is discussed. Two different initial profiles in each of two different geometries are analyzed, and the importance of using realistic starting conditions to predict supersonic nozzle performance is demonstrated.

N81-16494/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Effects of Mistuning on Bending-Torsion Flutter and Response of a Cascade in Incompressible Flow.
K. R. V. Kaza, and R. E. Kielb. 1981, 20p NASA-TM-81674, DOE/NASA/1028-29
Contract EX-76-I-01-1028
Proposed for Presentation at Dyn. Specialists Conf., Atlanta, 9-11 Apr. 1981; Sponsored by Aiaa.

The effect of small differences between the individual blades (mistuning) on the aeroelastic stability and response of a cascade were studied. The aerodynamic, inertial, and structural coupling between the bending and torsional motions of each blade and the aerodynamic coupling between the blades was considered. A digital computer program was developed to conduct parametric studies. Results indicate that the mistuning has a beneficial effect on the coupled bending torsion and uncoupled torsion flutter. On forced response, however, the effect may be either beneficial or adverse, depending on the engine order of the forcing function. The results also illustrate that it may be feasible to utilize mistuning as a passive control to increase flutter speed while maintaining forced response at an acceptable level.

N81-16852/8 PC **A10**/MF **A01**
Pratt and Whitney Aircraft Group, East Hartford, CT. Commercial Products Div.
A Design Procedure for Fan Inflow Control Structures.
Final Rept.,
M. R. Gedge. Sep 80, 203p NASA-CR-165625
Contract NAS1-15085
Prepared in Cooperation with Boeing Commercial Airplane CO., Seattle.

Significant differences exist in the noise generated by engine in flight and engines operating on the test stand. It was observed that these differences can be reduced by use of an inflow control structure (ICS) in the static test configuration. The results of the second phase of a three phase program are described and the results of a test program conducted to assess and modify various theoretical models, leading to the development of an ICS design system is summarized.

N81-16853/6 PC **A06**/MF **A01**
Pratt and Whitney Aircraft Group, East Hartford, CT. Commercial Products Div.
Studies on Proper Simulation During Static Testing of Forward Speed Effects on Fan Noise.
Final Rept.,
A. A. Peracchio, U. W. Ganz, M. R. Gedge, and K. Robbins. Sep 80, 103p NASA-CR-165626
Contract NAS1-15085
Prepared in Cooperation with Boeing Commercial Airplane CO., Seattle.

Significant differences exist in the noise generated by engines in flight and engines operating on the test stand. It was observed that these differences can be reduced by the use of an inflow control structure (ICS) in the static test configuration. The results of the third phase of a three phase program are described. The work performed in the first two phases which dealt with the development of a model for atmospheric turbulence, studies of fan noise generated by rotor turbulence interaction, and the development of an inflow control structure design system are summarized. The final phase of the program covers procedures for performing static testing with an ICS projecting the resulting static test data to actual flight test data. Included is a procedures report which covers the design system and techniques for static testing and projecting the static data to flight.

N81-16854/4 PC **A12**/MF **A01**
General Electric Co., Cincinnati, OH. Aircraft Engine Group.
Acoustic and Aerodynamic Performance Investigation of Inverted Velocity Profile Coannular Plug Nozzles.
Final Report.
P. R. Knott, J. T. Blozy, and P. S. Staid. Feb 81, 259p NASA-CR-3149, R79AEG388
Contract NAS3-19777

The results of model scale parametric static and wind tunnel aerodynamic performance tests on unsuppressed coannular plug nozzle configurations with inverted velocity profile are discussed. The nozzle configurations are high-radius-ratio coannular plug nozzles applicable to dual-stream exhaust systems typical of a variable cycle engine for Advanced Supersonic Transport application. In all, seven acoustic models and eight aerodynamic performance models were tested. The nozzle geometric variables included outer stream radius ratio, inner stream to outer stream ratio, and inner stream plug shape. When compared to a conical nozzle at the same specific thrust, the results of the static acoustic tests with the coannular nozzles showed noise reductions of up to 7 PNdB. Extensive data analysis showed that the overall acoustic results can be well correlated using the mixed stream velocity and the mixed stream density. Results also showed that suppression levels are geometry and flow regulation dependent with the outer stream radius ratio, inner stream-to-outer stream velocity ratio and inner stream velocity ratio and inner stream plug shape, as the primary suppression parameters. In addition, high-radius ratio coannular plug nozzles were found to yield shock associated noise level reductions relative to a conical nozzle. The wind tunnel aerodynamic tests showed that static and simulated flight thrust coefficient at typical takeoff conditions are quite good - up to 0.98 at static conditions and 0.974 at a takeoff Mach number of 0.36. At low inner stream flow conditions significant thrust loss was observed. Using an inner stream conical plug resulted in 1% to 2% higher performance levels than nozzle geometries using a bent inner plug.

21G. Reciprocating Engines

AD-A095 110/3 PC **A05**/MF **A01**
Cairo Center for Combustion (Egypt).
Spray Modelling for Multifuel Engines.
Annual technical rept. no. 1, Mar 79-Apr 80,
M. M. Elkotb. Jul 80, 78p
Grant DA-ERO-79-G-0017

The present project deals with the fuel spray modelling in multifuel engines using the droplet behav-

iour approach. The multifuel engine is able to burn different types of fuel having various physical and chemical properties, either clear or mixture with arbitrary mixing ratio. Analysis of the physical and chemical properties affecting mixture creation and combustion have been carried out to define the parameters affecting the accuracy of spray modelling. It is found that the spray is affected by air flow field, heat transfer, fuel atomization, droplet behaviour, fuel evaporation and chemical kinetics. Solution of the flow field and experimental results of heat transfer have been obtained. Experiments were performed in a set up that allowed variation of the swirl chamber geometry and operating conditions to evaluate the instantaneous surface heat transfer under firing conditions. The instantaneous heat flux was determined taking into consideration the instantaneous composition of products and variation of specific heats. A generalized expression has been established for the calculation of heat transfer to the chamber wall under variable design and operating conditions.

DOE/ET/15444-T11 PC **A03**/MF **A01**
Advanced Mechanical Technology, Inc., Newton, MA.
Evaluation of Improved Materials for Stationary Diesel Engines Operating on Residual and Coal Based Fuels. Final Report.
1980, 28p
Contract AC03-79ET15444

Experimental results to date from an on-going research program on improved materials for stationary diesel engines using residual or coal-based fuels are presented with little discussion of conclusions about these results. Information is included on ring and liner wear, fuel oil qualities, ceramic materials, coatings, test procedures and equipment, and tribology test results. (ERA citation 06:007947)

N81-16052/5 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
An Overview of General Aviation Propulsion Research Programs at NASA Lewis Research Center.
E. A. Willis, and W. C. Strack. 1981, 48p NASA-TM-81666, E-686
Proposed for Presentation at the Natl. Business Aircraft Meeting, 13-15 Apr. 1981, Wichita, Kansas; Sponsored by Sae.

The review covers near-term improvements for current-type piston engines, as well as studies and limited corroborative research on several advanced g/a engine concepts, including diesels, small turboprops and both piston and rotary stratified-charge engines. Also described is basic combustion research, cycle modeling and diagnostic instrumentation work that is required to make new engines a reality.

N81-16054/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Experimental Analysis of IMEP in a Rotary Combustion Engine.
H. J. Schock, W. J. Rice, and P. R. Meng. 1981, 44p NASA-TM-81662, E-680
Presented at Intern. Symp. Of Automotive Engr., Detroit, 23-27 Feb. 1981.

A real time indicated mean effective pressure measurement system is described which is used to judge proposed improvements in cycle efficiency of a rotary combustion engine. This is the first self-contained instrument that is capable of making real time measurements of IMEP in a rotary engine. Previous methods used require data recording and later processing using a digital computer. The unique features of this instrumentation include its ability to measure IMEP on a cycle by cycle, real time basis and the elimination of the need to differentiate volume function in real time. Measurements at two engine speeds (2000 and 3000 rpm) and a full range of loads are presented, although the instrument was designed to operate to speeds of 9000 rpm.

21H. Rocket Motors and Engines

AD-A094 632/7 PC **A10**/MF **A01**
Lockheed Missiles and Space Co., Inc., Huntsville, AL. Huntsville Research and Engineering Center.
Supersonic Flow of Chemically Reacting Gas-Particle Mixtures. Volume I. A Theoretical Analysis and Development of the Numerical Solution,
Morris M. Penny, Sheldon D. Smith, Peter G. Anderson, Peter R. Sulyma, and Marcus L. Pearson. Jan 76, 204p Rept no. LMSC-HREC-TR-D496555-1
Contract NAS9-14517
See also Volume 2, AD-A094 633.

This report describes a numerical solution for chemically reacting supersonic gas-particle flows in rocket nozzles and exhaust plumes. The gas-particle flow solution is fully coupled in that the effects of particle drag and heat transfer between the gas and particle phases is treated. Gas and particulates exchange momentum via the drag exerted on the gas by the particles. Energy is exchanged between the phases via heat transfer (convection and/or radiation between the gas-particle phases). Basic assumptions made in the development of the governing equations are similar to those employed by previous investigators. The primary exception is the treatment of chemical effects in the gas phase. Thermochemistry calculations (chemical equilibrium, frozen or chemical kinetics) are shown to be uncoupled from the flow solution and, as such, can be solved separately. The solution to the set of governing equations is obtained by utilizing the method of characteristics. The equations cast in characteristic form are shown to be formally the same for ideal, frozen, chemical equilibrium and chemical non-equilibrium reacting gas mixtures. The characteristic directions for the gas-particle system are found to be the conventional gas Mach lines, the gas streamlines and the particle streamlines.

AD-A094 633/5 PC **A19**/MF **A01**
Lockheed Missiles and Space Co., Inc., Huntsville, AL. Huntsville Research and Engineering Center.
Supersonic Flow of Chemically Reacting Gas-Particle Mixtures. Volume II. RAMP - A Computer Code for Analysis of Chemically Reacting Gas-Particle Flows,
Morris M. Penny, Sheldon D. Smith, Peter G. Anderson, Peter R. Sulyma, and Marcus L. Pearson. Jan 76, 448p Rept no. LMSC-HREC-TR-D496555-2
Contract NAS9-14517
See also Volume 1, AD-A094 632.

Most solid rocket motor propellants contain metal additives which increase the energy content of the system and also suppress combustion pressure instabilities. The presence of these metal additives, however, results in condensed products in the exhaust which can do no expansion work and thereby reduce the effectiveness of the nozzle. Also, the presence of liquid or solid particles in the exhaust will contribute significantly to radiation and plume impingement heating on structures which are either immersed or in proximity to the exhaust plume. It is therefore important to know the physical properties of both the solids and gases throughout the nozzle and exhaust plumes. This report describes two computer programs which are applicable to the analysis of chemically reacting gas-particle flow fields.

AD-A094 764/8 PC **A07**/MF **A01**
TRW Defense and Space Systems Group, Redondo Beach, CA.
FLTSATCOM Flight 2 RCS Anomaly Investigation Ground Verification Test.
Final rept.,
G. W. Joseph. 30 Jan 81, 146p TRW-36244-350-004-01, SD-TR-80-58
Contract F04701-79-C-0174

Thruster Hot-fire Ground Verification Tests have been performed in an attempt to understand the thruster anomalies that were experienced on the FLTSATCOM Flight 2 spacecraft (IRON 6392). While the test objectives of determining the effect of gas bubble ingestion, cold starts with isolation valves closed, effect of seat leakage on first pulses, and susceptibility to 'choking' were accomplished, the exact cause for the anomaly was not established. No deleterious effects from cold starts with isolation valves closed were observed. (Author)

21I. Rocket Propellants

AD-A094 618/6 PC **A02**/MF **A01**
Princeton Univ., NJ. Dept. of Mechanical and Aerospace Engineering.
Solid Propellant Combustion Mechanism Research 1975-1980.
Final rept. 1 Apr 75-31 Mar 80,
Leonard H. Caveny, Martin Summerfield, Josette Bellan, and Moshe BenReuven. Apr 80, 20p
Rept no. MAE-1490
Contract N00014-75-C-0705

The multi-task research conducted during the five years of the contract was aimed at furthering the scientific understanding of propellant combustion processes. The low pressure deflagrations of nitramines were interpreted by a physical model that accounts for the interactions among the condensed phase, surface, and near field flame zones. The model demonstrated the importance of considering both primary and secondary gas phase processes. Chamber flow interactions with propellants having extended flame zones elucidated contributions to erosive burning and sustained acoustic oscillations. The analysis points to the existence of an additional source of acoustic energy produced by couplings with heat addition from residual reactions in the chamber gases. Droplet burning was analyzed in terms of a reduced boundary condition at the surface and the quasi-steady heat feedback assumption. A formalism is offered for experimentally evaluating the boundary conditions for nonsteady conditions. Direct measurements of solid propellant acoustic admittance were made using laser doppler velocimetry coupled with an optical technique for tracking the burning surface. This report contains abstracts of the detailed publications on each topic. (Author)

AD-A094 719/2 PC **A03**/MF **A01**
Harry Diamond Labs., Adelphi, MD.
Performance of Ram Air Driven Power Supply for Proposed High Altitude Rocket in Naval Surface Weapons Center Supersonic Wind Tunnel.
Technical memo.,
Jonathan E. Fine. Nov 80, 47p Rept no. HDL-TM-80-31

A ram air driven power supply for the Multiple Launch Rocket System (MLRS) air vehicle was tested with a fuze in the Naval Surface Weapons Center Supersonic Wind tunnel Facility. The power supply operated the fuze over the apex of a probable flight trajectory where the generator's inlet ram air energy input is small. A method has been devised to relate laboratory, wind tunnel, and field test data so that expected voltages in flight or in the wind tunnel can be obtained from laboratory measurements. (author)

AD-A094 720/0 PC **A03**/MF **A01**
Naval Surface Weapons Center, Silver Spring, MD.
Production and Assessment of Damaged High Energy Propellant Samples,
Wayne L. Elban. 8 May 80, 41p Rept no. NSWC/TR-79-259

This work was undertaken to subject a variety of high energy propellants to different stress fields and to assess the microstructural changes that occur. Low strain rate mechanical deformation in compression and low temperature thermal stressing were used to damage samples. These materials were tested nondestructively using ultrasonics in which longitudinal sound velocity measurements were made. Microscopic examination was performed on microtomed sections of damaged and undamaged propellant, as well as on fracture surfaces when appropriate. Propellant recovered from a low amplitude shock sensitivity experiment, an aquarium shot, was also evaluated for comparison purposes. In general, propellant samples that had been compressed at low strain rate did not undergo extensive damage. Crack densities were

very low, and dewetting was the observed damage mechanism. Propellant samples exposed to liquid nitrogen exhibited numerous brittle fractures and little, if any, dewetting. Based on sound velocity measurements, the deformation was localized, leaving a large volume of material undisturbed. Propellant recovered from the aquarium experiment was damaged most extensively of all the material examined in this work. The crack number density and the area of crack surfaces/unit volume of propellant were highest. Sound velocity measurements indicate that dewetting did not occur in sizable portions of the material and that again the deformation was localized. (Author)

N81-16176/2 PC **A04**/MF **A01**
Tennessee Technological Univ., Cookeville.
Perturbation Solutions of Combustion Instability Problems.
A. Googerdy, J. Peddieson, Jr., and M. Ventrice.
Oct 79, 66p NASA-CR-159643
Contract NGR-43-003-015

A method involving approximate modal analysis using the Galerkin method followed by an approximate solution of the resulting modal-amplitude equations by the two-variable perturbation method (method of multiple scales) is applied to two problems of pressure-sensitive nonlinear combustion instability in liquid-fuel rocket motors. One problem exhibits self-coupled instability while the other exhibits mode-coupled instability. In both cases it is possible to carry out the entire linear stability analysis and significant portions of the nonlinear stability analysis in closed form. In the problem of self-coupled instability the nonlinear stability boundary and approximate forms of the limit-cycle amplitudes and growth and decay rates are determined in closed form while the exact limit-cycle amplitudes and growth and decay rates are found numerically. In the problem of mode-coupled instability the limit-cycle amplitudes are found in closed form while the growth and decay rates are found numerically. The behavior of the solutions found by the perturbation method are in agreement with solutions obtained using complex numerical methods.

N81-16177/0 PC **A06**/MF **A01**
Aerojet Liquid Rocket Co., Sacramento, CA.
High-Density Fuel Combustion and Cooling Investigation.
Final Report, Oct. 1977 - Aug. 1980.
R. J. Labotz, D. C. Rousar, and H. W. Valler. Sep 80, 114p NASA-CR-165177
Contract NAS3-21030

The analysis, design, fabrication and testing of several engine configurations are discussed with respect to the combustion and heat transfer characteristics of LOX/RP-1 at chamber pressures between 6895 and 13790 kPa (1000 and 2000 psia). The different engine configurations discussed include: 8274 kPa and 13790 kPa (1200 psia and 2000 psia) chamber pressure injectors with like doublet and preatomized triplet elements; cooled and uncooled acoustic resonators; and graphite, regeneratively cooled and calorimetric chambers ranging in length from 27.9 to 37.5 cm (11 to 15 in.). A high pressure LOX/RP-1 spark igniter is also evaluated.

N81-16310/7 PC **A08**/MF **A01**
Aerojet Liquid Rocket Co., Sacramento, CA.
Photographic Combustion Characterization of LOX/Hydrocarbon Type Propellants.
Final Rept.,
D. C. Judd. 15 Aug 80, 164p NASA-CR-160906, MA-129T
Contract NAS9-15724
Original Contains Color Illustrations.

The advantages and limitations of using high speed photography to identify potential combustion anomalies (pops, fuel freezing, reactive stream separation (RSS), carbon formation) were demonstrated. Combustion evaluation criteria were developed for evaluating, characterizing, and screening promising low cost propellant combination(s) and injector element(s) for long life, reusable engine systems. Carbon formation and RSS mechanisms and trends were identified by using high speed color photography at speeds up to 6000 frames/sec. Single element injectors were tested with LOX/RP-1, LOX/Propane, LOX/Methane and LOX/Ammonia propellants. Tests were conducted using seven separate injector elements. Five different conventionally machined elements were tested: OFO Triplet; Rectangular Unlike Doublet (RUD); Unlike Doublet (UD); Like on Lke Doublet (LOL-EDM); and Slit Triplet.

22. SPACE TECHNOLOGY

22A. Astronautics

NASA-RP-1059 PC **A12**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Space Transportation System and Associated Payloads: Glossary, Acronyms, and Abbreviations.
Reference publication.
Jan 81, 266p

The report contains a compilation of acronyms used at the Kennedy and Johnson Space Centers in the Space Transportation System.

N81-16075/6 PC **A01**
National Aeronautics and Space Administration, Washington, DC.
Materials Processing in Space: Early Experiments.
R. J. Naumann, and H. W. Herring. 1980, 123p
NASA-SP-443, LC-80-607081
Original Contains Color Illustrations.

The characteristics of the space environment were reviewed. Potential applications of space processing are discussed and include metallurgical processing, and processing of semiconductor materials. The behavior of fluid in low gravity is described. The evolution of apparatus for materials processing in space was reviewed.

N81-16076/4 PC **A12**/MF **A01**
Scientific Translation Service, Santa Barbara, CA.
Problems of Space Production.
V. S. Avduyevskiy, I. V. Barmin, S. D. Grishin, L. V. Leskov, and A. M. Petrov. Dec 80, 264p
NASA-TM-76418
Contract NASW-3198
Transl. Into English of the Book "Problemy Kosmicheskogo Proizvodstva" Moscow, Machinostroyeniye Press, 1980 p 1-221. Translated by Scientific Translation Service, Santa Barbara, Calif.

Theoretical principles are presented for the production of materials in space. Conditions are examined for conducting technological processes on board space vehicles in weightlessness. Principles are analyzed for planning experimental equipment to process materials in space. A classification, the current condition and outlook for conducting research in the main fields of the space industry are given.

N81-16080/6 PC **A03**/MF **A01**
Howard Univ., Washington, DC.
Study of Foldable Elastic Tubes for Large Space Structure Applications.
Final Report, Feb. - Dec. 1980.
I. W. Jones, and C. D. Williams. Jan 81, 46p
NASA-CR-163886
Grant NSG-1320

Various modifications were made to the tube design. The tubes were retested and analyzed, and the results are presented. One type of modified tube, the slotted tube, deployed successfully and reliably, and became the focus of detailed tests. Optimal design criteria, taking into consideration deployment as well as strength and buckling behavior were established.

N81-16109/3 PC **A05**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Report to the NASA Administrator by the Aerospace Safety Advisory Panel on the Space Shuttle Program. Part 1: Observations and Conclusions.
Annual Report.
Jun 76, 100p NASA-TM-82251

Each system was chosen on the basis of its importance with respect to crew safety and mission success. An overview of the systems management is presented. The space shuttle main engine, orbiter thermal protection system, avionics, external tanks and solid rocket boosters were examined. The ground test and ground support equipment programs were studied. Program management was found to have an adequate understanding of the significant ground and flight risks involved.

N81-16111/9 PC **A12**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Space Transportation System and Associated Payloads: Glossary, Acronyms, and Abbreviations.
Jan 81, 265p NASA-RP-1059

A collection of acronyms in everyday use concerning shuttle activities is presented. A glossary of terms pertaining to the Space Transportation System is included.

N81-16112/7 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Annual Report to the NASA Administrator by the Aerospace Safety Advisory Panel on the Space Shuttle Program. Part 1: Observations and Conclusions.
Annual Report.
Mar 77, 63p NASA-TM-82244

The panel reviewed the following areas of major significance for the Approach and Landing Test program: mission planning and crew training, flight-readiness of the Carrier Aircraft and the Orbiter, including its flight control and avionics system, facilities, and communications and ground support equipment. The management system for risk assessment was investigated. The Orbital Flight Test Program was also reviewed. Observations and recommendations are presented.

N81-16113/5 PC **A11**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Annual Report to the NASA Administrator by the Aerospace Safety Advisory Panel on the Space Shuttle Program. Part 2: Summary of Information Developed in the Panel's Fact-Finding Activities.
Annual Report.
Mar 77, 232p NASA-TM-82245

The panel focused its attention on those areas that are considered most significant for flight success and safety. Elements required for the Approach and Landing Test Program, the Orbital Flight Test Program, and those management systems and their implementation which directly affect safety, reliability, and quality control, were investigated. Ground facilities and the training programs for the ground and flight crews were studied. Of special interest was the orbiter thermal protection subsystems.

N81-16114/3 PC **A14**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Annual Report to the NASA Administrator by the Aerospace Safety Advisory Panel on the Space Shuttle Program. Part 2: Summary of Information Developed in the Panel's Fact-Finding Activities.
Annual Rept.,
Jun 76, 312p NASA-TM-82252

Safety management areas of concern include the space shuttle main engine, shuttle avionics, orbiter thermal protection system, the external tank program, and the solid rocket booster program. The ground test program and ground support equipment system were reviewed. Systems integration

and technical 'conscience' were of major priorities for the investigating teams.

N81-16115/0 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Annual Report to the NASA Administrator by the Aerospace Safety Advisory Panel. Part 2: Space Shuttle Program. Section 1: Observations and Conclusions.
Annual Report.
Jun 75, 37p NASA-TM-82248

The NASA and contractor management systems, including policies, practices, and procedures for the development of critical systems, subsystems and integration of the program elements, were investigated. The technical development status of critical systems, subsystems, and interfaces is presented. Space shuttle elements were qualified as to potential risks and hazards. The elements included the orbiter, external tanks, main engine, solid rocket boosters, and the ground support facilities.

N81-16116/8 PC **A14**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Annual Report to the NASA Administrator by the Aerospace Safety Advisory Panel. Part 2: Space Shuttle Program. Section 2: Summary of Information Developed in the Panel's Fact-Finding Activities.
Annual Rept.,
Jun 75, 284p NASA-TM-82249

The management areas and the individual elements of the shuttle system were investigated. The basic management or design approach including the most obvious limits or hazards that are significant to crew safety was reviewed. Shuttle program elements that were studied included the orbiter, the space shuttle main engine, the external tank project, solid rocket boosters, and the launch and landing elements.

N81-16624/1 PC **A13**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Environmental Impact Statement for the Space Shuttle Program.
Final Rept.,
M. S. Malkin. Apr 78, 296p NASA-TM-82278
Revised.

Test firings and launches will release air pollutants causing a temporary localized small degradation in air quality near the tests or launch site. Areas adjacent to the site will also be subjected to moderate sound levels of predominantly low frequencies for short durations. During the launch phase, hydrogen chloride will be introduced into the stratosphere causing a small decrease in ozone. Temporary perturbations to the ionosphere will occur during orbital maneuvers and entry will have no significant effect on communication or radio wave propagation. As the Orbiter descends, a low magnitude sonic beam will be produced along the groundtrack with maximum overpressures occurring near the landing site. The overpressures will be infrequent, will vary in location and are of sufficiently low energy to be considered a momentary annoyance, if noticed at all. Major alternatives considered are discontinuation or postponement of the program, use of alternate propellants and neutralization of the ground cloud.

PB81-859423 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Space Navigation. January, 1971-December, 1980 (Citations from the NTIS Data Base).
Rept. for Jan 71-Dec 80.
Feb 81, 251p NERACUSGNT3211

This retrospective bibliography contains citations concerning space navigation techniques, technology, and accuracy for a variety of manned and unmanned spacecraft and satellites. Space navigation instrumentation and systems are covered, as is their performance in both hypothetical and actual situations. Some attention is also given to international cooperation and legal questions relating to space navigation. (Contains 259 citations, fully indexed and including a table of contents.)

PB81-859431 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Space Navigation. January, 1972-December, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for Jan 72-Dec 80.
Feb 81, 215p NERACIAANT3211

This retrospective bibliography contains citations concerning space navigation techniques, technology, and accuracy for a variety of manned and unmanned spacecraft and satellites. Space navigation instrumentation and systems are covered, as is their performance in both hypothetical and actual situations. Some attention is also given to international cooperation and legal questions relating to space navigation. (Contains 214 citations, fully indexed and including a table of contents.)

22B. Spacecraft

N81-16084/8 PC **A06**/MF **A01**
Old Dominion Univ., Norfolk, VA. Dept. of Physics.
Radiation Studies of Optical and Electronic Components Used in Astronomical Satellite Studies.
Final Rept., period ending 31 Jul. 1980.
J. Becher, and R. L. Kernell. Jan 81, 106p
NASA-CR-163873, PTR-81-1
Grant NSG-5053

The synchronous orbit of the IUE carries the satellite through Earth's outer electron belt. A 40 mCi Sr90 source was used to simulate these electrons. A 5 mCi source of Co60 was used to simulate bremmstrahlung. A 10 MeV electron Linac and a 1.7 MeV electron Van de Graaf wer used to investigate the energy dependence of radiation effects and to perform radiations at a high flux rate. A 100 MeV proton cyclotron was used to simulate cosmic rays. Results are presented for three instrument systems of the IUE and measurements for specific components are reported. The three instrument systems were the ultraviolet converter, the fine error sensor (FES), and the SEC vidicon camera tube. The components were optical glasses, electronic components, silicon photodiodes, and UV window materials.

N81-16085/5 PC **A08**/MF **A01**
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
Solar Power Satellite Cost Estimate.
R. J. Harron, and R. C. Wadle. Jan 81, 169p
NASA-TM-58231, JSC-17053

The solar power configuration costed is the 5 GW silicon solar cell reference system. The subsystems identified by work breakdown structure elements to the lowest level for which cost information was generated. This breakdown divides into five sections: the satellite, construction, transportation, the ground receiving station and maintenance. For each work breakdown structure element, a definition, design description and cost estimate were included. An effort was made to include for each element a reference that more thoroughly describes the element and the method of costing used. All costs are in 1977 dollars.

N81-16835/3 PC **A02**/MF **A01**
Fort Lewis Coll., Durango, CO.
Spacecraft Utility and the Development of Confidence Intervals for Criticality of Anomalies.
Interim Report, Jan. - Oct. 1980.
R. E. Williams. Nov 80, 25p NASA-CR-160090
Contract NAG5-1

The concept of spacecraft utility, a measure of its performance in orbit, is discussed and its formulation is described. Performance is defined in terms of the malfunctions that occur and the criticality to the mission of these malfunctions. Different approaches to establishing average or expected values of criticality are discussed and confidence intervals are developed for parameters used in the computation of utility.

22C. Spacecraft Trajectories and Reentry

AD-A094 773/9 PC **A06**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Three Dimensional Orbital Stability About the Earth-Moon Equilateral Libration Points.
Master's thesis,
Howard A. Tilton. Dec 80, 108p Rept no. AFIT/GA/AA/80D-4

A search for a stable three dimensional orbit for a satellite about L4 is performed. A proposed two dimensional very restricted orbit is used to supply the initial conditions required for the search. An ephemeris of high accuracy is generated from a specific date and time using actual positions for the sun and moon. The generated sun and moon position and velocity vectors are used in the integration of the system's equations of motion. A stable orbit is found and is tested for its length of stability. The orbit is found to have a stable lifetime in excess of six hundred lunar synodic months. The sensitivity of the orbit to the sun's and moon's position is tested and found to be only slightly sensitive for an error in position of one quarter day. Finally, a predicted 180 deg out of phase orbit is found and is determined to be only marginally stable.

AD-A094 811/7 PC **A04**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Three Burn Inertial Upper Stage Optimal Orbit Transfer.
Master's thesis,
Mark N. Brown. Dec 80, 62p Rept no. AFIT/GA/AA/80D-1

The Inertial Upper Stage (IUS) being developed for use aboard the Space Shuttle is composed of three solid fuel stages plus a satellite payload. One mission of the IUS system is to launch from a shuttle parking orbit and place the satellite in geosynchronous orbit in minimum time. Actual Space Shuttle parking orbit data and IUS characteristics were used in this study to examine the sequential timing and orientation in inertial space of each stage as it is fired while the spacecraft moves along a transfer orbit to geosynchronous orbit. In addition, the sensitivity of the total transfer time and the final orbital state was found as a result of not meeting one or all of the time and orientation parameters. This problem is unique in that it considers an optimal orbit transfer problem involving solid fuel stages of fixed thrust and burn time. Previous work with liquid fuel engines examined orbital transfers with the intent of minimizing the amount of propellant or required velocity change needed to accomplish the transfer. (Author)

AD-A094 812/5 PC **A05**/MF **A01**
Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
Modal Control of a Satellite in Orbit about L3.
Master's thesis,
William L. Shelton. Dec 80, 84p Rept no. AFIT/GA/AA/80D-3

A modal control scheme was developed for linear systems that are time periodic. The scheme was then applied to a satellite in orbit aobut the earth-moon Lagrange point, L3. A theoretical control gain prediction was also devised and then verified by numerical results. The feasibility of the control scheme was then verified by computer simulations by controlling the actual non-linear motions of the satellite with the linearly derived controller. The satellite control costs were found to be 30 percent less than the control costs of a satellite in earth-synchronous orbit. (Author)

22D. Spacecraft Launch Vehicles and Ground Support

N81-16083/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cocoa Beach, FL. John F. Kennedy Space Center.

Launch Mission Summary: Comstar D-4 Atlas/ Centaur-42.
12 Feb 81, 11p NASA-TM-82236, KSC-GP-15-15

Information relative to launch windows, flight plan, and radar and telemetry coverage is presented. Also included is selected trajectory information and a brief sequence of light events.

KEYWORD INDEX

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Index entries in this section are selected to indicate important ideas and concepts presented in a report. When using the keyword index, be sure to look under terms narrower, broader, or related to a particular topic. Although some of the keywords are not selected from a controlled vocabulary of terms, most of them have been selected from the DoD, DoE, NASA, or NTIS controlled vocabularies. The entries are arranged by keyword and then by the NTIS order number.

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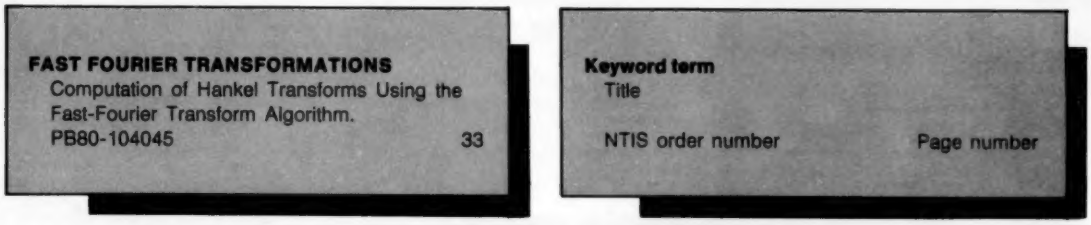

ABSORPTION REFRIGERATION CYCLE
Water-Lithium Bromide Double-Effect Absorption Cooling Analysis.
DOE/SF/10540-T1 2408

ABT CONCEPT
Reprint: Comments on the 'ABT-Concept',
PB81-139925 2363

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The Soviet Academy of Sciences and Technological Development,
AD-A094 830/7 2315

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Response of the Cardiovascular System to Vibration and Combined Stresses.
AD-A094 792/9 2353

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Effective Radiological Safety Program for Electron Linear Accelerators.
SLAC-PUB-2643 2446

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Hall Magnetometers for Stationary Magnetic Fields with Registration in the Magnetic Field Units.
JINR-R-9-12517 2428

ACCIDENT INVESTIGATIONS
Aircraft Accident Report - Air Traders International, Lockheed 1049H, N74CA, Columbus, Indiana, June 22, 1980.
PB80-910414 2305

ACCIDENTS
The Use of Hospital In-Patient Data in the Analysis of the Injuries Sustained by Road Accident Casualties,
PB81-161804 2319

ACETATES
Membrane Research for Salinity Gradient Energy Production. Final Report.
DOE/ET/20364-T1 2356

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Hemorheological Changes, the State of Microcirculation, and Blood Acid-Base Balance in Rats under Conditions of a 30-Day Limiting of the Motor Activity.
N81-16719/9 2353

ACID ELECTROLYTE FUEL CELLS
Fabrication and Testing of TAA Bonded Carbon Electrodes. Final Report, March 1978 - May 1979.
DOE/ET/11303-T8 2391

Electrode Optimization for Phosphoric Acid Fuel Cells. Quarterly Technical Progress Report No. 3.
DOE/ET/13114-T3 2391

Fabrication and Testing of TAA Bonded Carbon Electrodes in Primary Fuel Cells. Technical Progress Report No. 2, June 1978 - September 1978.
DOE/ET/13114-T4 2391

ACID RAIN
Acid Rain: The Impact of Local Sources.
DOE/METC/14787-103 2410

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AD-A095 112/9 2435

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LA-8560-MS 2347

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AD-A094 998/2 2334

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PB81-117913 2323

ADRENAL GLAND
Cushing's Syndrome. January, 1978-November, 1980 (Citations from the Information Retrieval, Ltd. Data Base).
PB81-858169 2342

ADSORPTION
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Marine Plant Biomass for Alcohol Fuels,
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The Male Drinking Driver: Characteristics of the Offender and His Offence,
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State Alcoholism Profile Information System (SAPIS): National Status Report.
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Study of Data Reliability and Quality Control from National Alcoholism Program Information System: Detailed Methodology and Findings. Volume II.
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Development of Alcohol-Based Synthetic Transportation Fuels from Coal-Derived Synthesis Gases. Third Quarterly Progress Report, April 1-June 30, 1980.
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Comprehensive Study of the Seismotectonics of the Eastern Aleutian Arc and Associated Volcanic Systems. Annual Progress Report, March 1, 1980-February 28, 1981.
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Pacific Seaweed Aquaculture, Proceedings of a Symposium on Useful Algae Held at Hopkins Marine Station of Stanford University, Pacific Grove, CA. on March 6-8, 1980,
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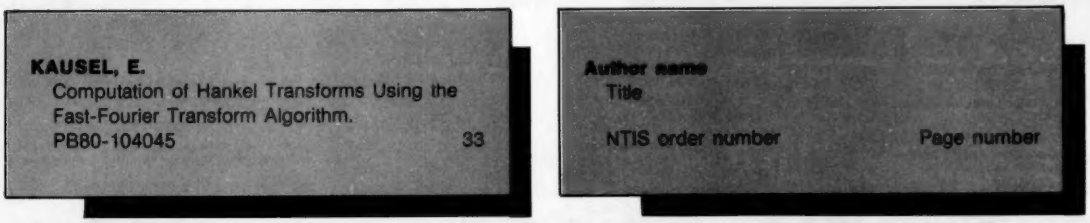

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Department of Energy, Washington, DC.
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F04701-75-C-0106
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